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Covent Garden celebrates its 300th anniversary page 199

Everclad buildings 3

Everclad plastic coated steel sheet scores on speed as well as colour

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Editorial Office
Ministry of Agriculture, Fisheries and Food
Tolcarne Drive
Pinner
Middlesex HA5 2DT 01–868 7161

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Covent Garden Market in 1737

Covent Garden Market

Ronald Webber

THIS year Covent Garden is celebrating its tercentenary as a market for it was in May 1670 that King Charles II granted William, Earl of Bedford, the right to hold a market for fruit, vegetables and other produce in a place 'commonly called the Piazza, near the Church of St. Paul, Covent Garden'.

In that year, 1670, the Covent Garden area had been laid out to the design of Inigo Jones and had become a very fashionable residential area. But the square itself had developed into a place where country folk and market gardeners brought produce to sell. A regular market was more or less established before the Earl of Bedford received his Charter; most of the business was carried on just outside the wall of the Earl's Bedford House (where the Jubilee Market is today). That very fine building, complete with garden and orchard, was demolished in 1705.

The eighteenth century

During the eighteenth century, Covent Garden grew busier as a market during the day while it acquired a reputation for disreputable behaviour after dark. The number of market gardeners increased but all sorts of other traders moved in as well. On Tuesdays, Thursdays and Saturdays, which became established as the main market days, the place was so crowded that vehicles could get through only with great difficulty.

The first stallholder of whom there is any record is one Sarah Sewell who was mentioned by Steele in the *Spectator* of 1712. Steele came down from Richmond on the river one morning and the boat in which he was travelling called in at Nine Elms and took on melons from a Mr. Cuffe who was sending them to Sarah Sewell and Company at Covent Garden. Steele landed at Strand Bridge with "ten sail of apricock Boats" and walked from there to the market.

Most of the produce in this century came from the market gardens along the banks of the Thames, some in horse-drawn carts, some by water, and, if it was something delicate like strawberries, on the heads of women who would often make two journeys a day from places like Fulham.

A general range of fruit and vegetables was grown, though certain districts specialized; Deptford for onions and Battersea for asparagus, the 'Battersea bundles of sparrow-grass' being particularly famous. A busy trade was also carried on with plants and shrubs, for by now plant nurseries such as the Brompton Park Nursery, Kingsland Nursery and the Vineyard at Hammersmith were in full swing. The containers in use were almost all made of wicker and there were basket-makers' huts all along the banks of the Thames, Chiswick Eyot being one of the best known spots. The containers had names such as pottle, loade, marne, strike and pad.

The nineteenth century

By the nineteenth century Covent Garden was bursting at the seams and it was to remain so for the remainder of its stay in this area, despite many efforts to do something about it. The greatest effort was in 1828 when an Act of Parliament was passed to enable the Duke of Bedford (the Earldom became a Dukedom in 1694) to build a new market.

Designed by Charles Fowler, the new building known as the Charter or Dedicated Market is the one still standing today. The central avenue, a passage with small shops on either side, was the focal point. To begin with, sellers of choice fruit and vegetables occupied these shops, which all sold retail. (It is interesting to note that one of these retail shops still exists in today's Central Avenue and sells choice fruit and vegetables.)

Parallel with Central Avenue were two other rows of shops but these did not have full protection against the weather. One part of the market was glassed over and used by the wholesale fruit salesmen. Another part was allocated to the vegetable salesmen, while the south row was all potatoes and root crops. A conservatory, seed shops and reading room were at the Russell Street end of the market. Around the Charter Market, in the open with only a large umbrella for protection in bad weather, were the market gardeners and flower sellers who carried on their businesses in very much the same way as they had done since their ancestors had arrived in the area early in the seventeenth century. In 1828, however, the market gardeners formed

the Market Gardeners, Nurserymen and Farmers Association an organization which took up their grievances and from which the present National Farmers Union can claim descent.

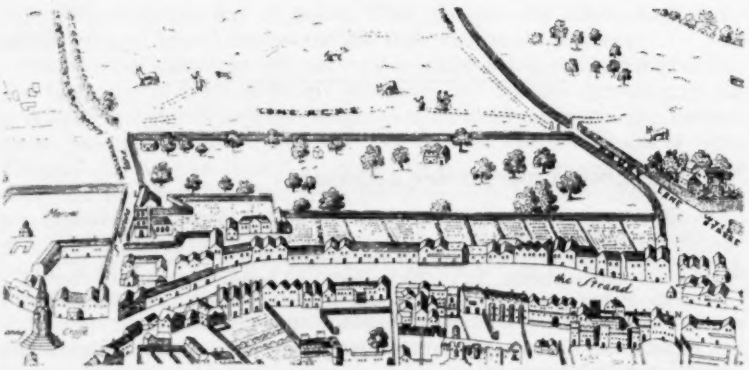
The new Charter Market, though attractive to look at and providing shelter for some, did little to ease the overcrowding, and not only was it soon packed to capacity but more and more streets surrounding the square were taken over by firms in the horticultural business. In 1860 when the Opera House was being rebuilt the proprietor added a hall for flowers to help ease the congestion. This was the present-day Floral Hall. But the Duke of Bedford was not over-pleased to have someone taking business away from him and in 1887 he bought the leasehold of the hall and incorporated it in the market as a place for selling foreign fruit. The flowers went to the new Flower Market in Wellington Street.

The twentieth century

In 1901 the Russell Street or 'Tin' Market went up, to be followed three years later by the Jubilee Market. But the market was still overcrowded and the market men were discontented over the toll they had to pay; the Duke tried to sell the market but neither the Metropolitan Board of Works (predecessors of the London County Council) nor the Corporation of the City of London were interested. In 1914, however, he sold it to Sir Joseph Beecham (for £2,500,000) and when, four years later, Sir Joseph died, the Covent Garden Estate Company was formed under the direction of the High Court to carry through the contract. In 1924 it was acquired by Covent Garden Properties and later by Covent Garden Market Ltd.

In the 1920s a serious attempt was made to move the market to a site belonging to the Foundling Hospital, situated off Gray's Inn Road in north London, where it was to be a terminal market for the Midland and Great Northern Railways.

But this arrangement fell through and no further serious attempt at moving was then made until recent years. In 1957 the report of the Runciman Committee on Marketing was published and it stated, among other things,



Convent Garden and the Seven Acres or the Long Acre. Reproduction (reduced) of part of Agas's Map, 1578
(*With the addition of the names Long Acre, Drury Lane and Wych Street*)

that Covent Garden ought not to be moved but improved under a statutory authority. Two years later the Covent Garden Market Authority was set up for the express purpose of re-organizing and improving the market. The Authority was not to be a trading organization but would own the main market buildings and some of the surrounding properties as well as having powers of licensing and regulation.

When the Authority took over the market in 1962, it had become a sprawl, extending over thirty acres of which only 6½ acres were market proper, the rest being premises belonging to private firms. It was one of the largest markets of its kind in the world, in fact, the largest of all until after the 1939-45 War when one or two planned markets abroad were built.

Although there had been no talk of the market moving when the Authority took over, the Government had indicated after the Covent Garden Market Act had been passed that they would be prepared to consider amending legislation should there be general agreement on a suitable site outside the established area.

The new site

One of the Authority's first jobs was to commission a survey to determine the best site for a new market, should a move ever be considered. Places such as Seven Dials, King's Cross, Wood Lane, Nine Elms and Beckton were all looked into; finally, after much discussion, it was decided that Covent Garden should be moved and that Nine Elms in the Vauxhall area of south London was the most suitable site for its new home.

The Authority in due course promoted a Private Bill the main purpose of which was to transfer the market and it became law in March 1966.

So, in 1973, if all goes well, Covent Garden will uproot itself from its home of over 300 years standing and move to Nine Elms, a region which, though now heavily industrialized, was once market garden land from where, as we have seen, Mr. Cuffe in 1712 grew melons to send to that shadowy figure of a saleswoman, Sarah Sewell, at her stand in Covent Garden.

This article has been contributed by **Ronald Webber,** one time Covent Garden Market man and a horticulturist by training. He is author of the book *Covent Garden—Mud Salad Market.*

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300 years—A memorable occasion

To recapture the old atmosphere of Covent Garden, the Covent Garden Market Authority and the traders are combining to mark the occasion of the **tercentenary on 9th May 1970** with a display of fruit, flowers and vegetables. In addition, there will be a programme of events for the Public to enjoy. There will also be porters' races, bands, a Punch and Judy show and a lot of other entertainment.

His Royal Highness The Duke of Edinburgh will visit the market on this memorable occasion.

Editor

The influence of physical environment upon land use and the agricultural pattern can still be seen. **Mary Griffiths, B.A., Ph.D.,** *of the University of Exeter discusses*

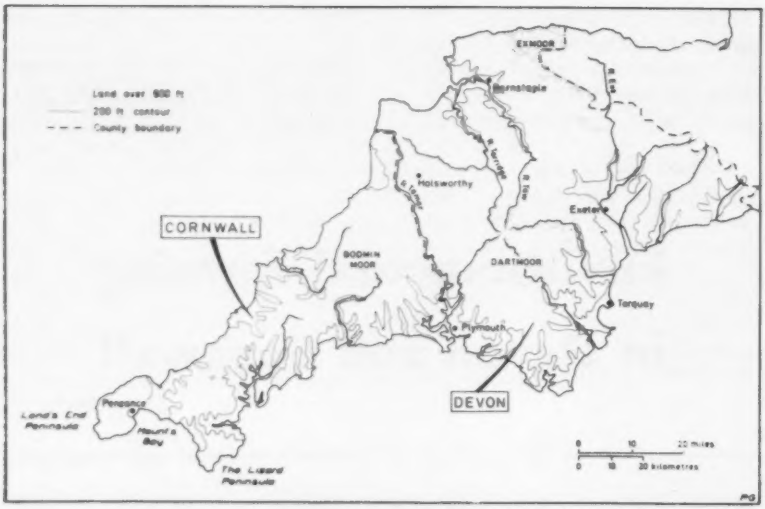
Environmental Farming in Devon and Cornwall

THE South-west is famous for its scenery and the varied nature of the relief and geology is reflected in the patterns of agricultural land use. The counties of Devon and Cornwall are famous also for their mild climate, but there is a considerable contrast between maritime areas and places further inland which affects the type of farming. While sub-tropical plants can be grown at sea level near Torquay, the moorlands of Dartmoor are too wet and exposed for the growth, to any extent, of trees. The potential of the physical environment alters considerably from one part of the region to another and some reasons for these variations will be examined in this article, taking first the climatic factor and then geology and relief.

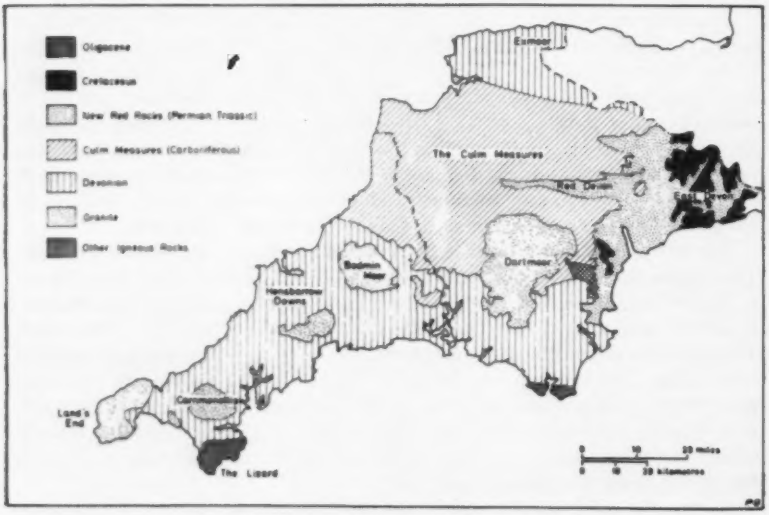
The maritime influence is especially strong in Cornwall, with the prevailing westerly winds and few places, with the exception of Bodmin Moor and east Cornwall, more than five miles from the sea. This means a relatively small daily and yearly range of temperature and although vegetation growth is slow in winter it rarely ceases in the coastal areas of Cornwall or South Devon. Inland, not only does the maritime influence decrease but the increase in altitude shortens the length of the growing season by about nine days with every 100 feet of ascent. Thus, the growing season declines to about 300 days in mid-Devon and 250 days in central Dartmoor.

The effect of altitude is seen not only in temperatures but in precipitation. The highlands of Bodmin Moor, Dartmoor and Exmoor (see diagram on p. 204) all receive well over fifty inches of rain every year on average. Precipitation increases by about one inch per mile as one moves inland from Torquay (thirty-seven inches) to Dartmoor, where the highest parts receive over ninety inches. In a line from the Exe valley to Barnstaple the total precipitation is less than forty inches, but over much of Devon and Cornwall it is between forty and fifty inches per annum. Although rainfall is usually lowest in May and June it is sufficient, with the natural reservoir in the soil, for plant growth throughout the year.

As grass is an ideal crop which makes full use of the long growing season and humid conditions, it is not surprising that three-quarters of Devon and Cornwall's farmland is under grass (excluding rough grazing). It is the danger of poaching on the heavier soils rather than lack of grass that causes farmers



The topography of Devon and Cornwall



The geology of Devon and Cornwall

to restrict grazing and bring cattle indoors by mid-November, even in some low-lying areas. If ground conditions are suitable grazing may start again by mid-March or even earlier.

Conditions are not so ideal for cereals due to fungus diseases which flourish in the warm, humid summer and to problems with perennial weeds. However, with the introduction of mechanization and improved plant varieties barley has increased fourfold in acreage in the last decade, especially at the expense of mixed corn, and it now accounts for three-quarters of the cereal acreage. The cultivation of barley is concentrated in the drier areas.

Distance from the sea, altitude and aspect cause considerable local differences in climatic conditions within the region. While the extreme south-west of Cornwall has approximately thirty days with gale force winds per annum (corresponding figure ten days on Dartmoor and two days on average in central England), the mild winters of the Isles of Scilly and Mounts Bay areas favour the growth of out-of-season and early horticultural produce. Another favoured area is the Tamar Valley, north of Plymouth, where the steep south-facing valley sides are cultivated for bulbs and fruits but the latter is declining because of high costs. The steep slopes pose problems of soil erosion but give good air drainage; the aspect means that they warm quickly while the temperatures are further ameliorated by the estuary extending inland. Contrast this region with the exposed moorland of Dartmoor, only eight miles to the east, where snow may lie for several weeks in winter and fodder must be taken to cattle and sheep outwintering on the common lands.

The contrasts in agriculture due to the climatic factor are accentuated by the strong differences in geology and relief within the area. The granite areas stand out most clearly on the geology map (on p. 204). The granite mass of Dartmoor, reaching to over 2,000 feet and the highest part of the South-west, is quite different from the surrounding countryside. The higher parts have leached, peaty soils which only support a moorland vegetation of grasses, bracken and heather used for sheep rearing and, to a lesser extent, cattle rearing. Bodmin Moor is also a granite area and again stands apart from the surrounding land, but being lower than Dartmoor, conditions are less harsh and cattle rearing predominates. To the west the remaining granite areas of Hensbarrow, Carnmeneilis, the Lands End peninsula and the Isles of Scilly (twenty-eight miles S.W. of Lands End) gradually decrease in height, receive a lower rainfall, have far less unenclosed moorland and are less easily distinguished from the surrounding non-granite countryside. In the Lands End Peninsula conditions are so temperate that dairy cattle graze enclosed pastures throughout the year. Geology alone is therefore not sufficient for regional differentiation because the relief and resultant climate also affect the soils and land use.

On the sandstones, shales and slates of Devonian age the topography affects the value of the agricultural land within the area probably more than the nature of the soil which develops on the Devonian rocks. The Devonian slates and shales weather to provide silty and silty clay loams, soils which have good structure and will crumble again after poaching. Although due to the high rainfall the soils are generally acid, the lime and phosphate deficiencies can be rectified. Streams have cut deeply into the land and the steep valley sides are a serious agricultural limitation. The gently rounded uplands, mainly between 300 and 500 feet, provide favourable conditions for cultivation with ley pastures and fodder crops, especially barley. But the

steep valley sides which separate these areas hinder communications and are unsuited to cultivation. They must be kept under grass which often shows a tendency to revert. Only where climatic conditions are especially favourable, as in the Tamar Valley, are these slopes cultivated for intensive, high value crops.

A dissected plateau extends over wide areas of Devon and Cornwall, but while the slightly graded uplands provide the most valuable agricultural land in many areas of Devonian rocks, it is the valley sides which are often best in the Culm Measure country. The Culm Measures, rocks of Carboniferous age, are best known for the heavy clay soils which develop on the shales around Holsworthy, to the north-west of Dartmoor, but the shales are interbedded with sandstones and these are more important to the east. The heavy, poorly drained soils result not only from the impervious nature of the underlying clay but from the relief and precipitation. On the level interfluves with precipitation of forty-five inches per annum bases are leached to accumulate in an iron pan some inches below the surface. The resultant gley soils are easily poached in winter, while in summer they have a tendency to dry out and crack if they have been ploughed. Thus, grassland predominates and rush infestation is a problem in some areas. In contrast, on the valley sides of, for example, the Torridge and Taw Rivers the drainage of the Culm shales is aided by the natural gradient of the land and the soils are more suited to cultivation, provided slopes are not too steep.

Red Devon, to the east of the Culms, is distinctive because of the colour of the soils which develop on the New Red Rocks of Permian and Triassic age. This region has the highest proportion of tillage in the South-west and has long been recognized as one of the most fertile parts of Devon. The rainfall of under thirty-five inches is less than in the rest of the South-west and the undulating land is fairly easy to plough. There are local variations, however, between the valley floor meadows and the cultivated land of the valley sides and between the sandstones and breccias which are highly cultivated and the marls which have a higher proportion of permanent pasture. Further contrasts in agricultural land use are again found in East Devon, for while the broad valleys are cut into the New Red Sandstones and marls, the plateau areas are calcareous grit, sand, gravel or clay with flints of Cretaceous age. Thus, while the valleys form productive agricultural land, the plateau areas stand out as heath or forest.

In the South-west the local variations in climate, geology, relief and soils are still to be seen in the patterns of agriculture and land use, even though attitudes to the physical environment are changing with modern techniques. The crawler tractor and modern drainage equipment can greatly improve the heavy Culm shales or aid the reclamation of a steep valley side in South Devon. Modern equipment and new plant varieties permit the increase in barley cultivation in areas formerly considered unsuitable. But the contrasts between regions of highly productive agriculture and regions of agricultural difficulty still remain.

Management by Objectives

A complete system designed to provide a systematic approach to successful farm management

THEORY and PRACTICE explained by

R. S. Boyer

SUCCESSFUL management of a modern business demands a bewildering array of activities on the part of the manager. So much so, that unless he adopts a systematic approach to his responsibilities, chaos will reign and result in bad decisions being made. Management by objectives is a complete system of management designed to prevent such a situation arising.

There is really nothing new in it, what it does is to combine a whole series of management functions into a logical plan of action for the business. A definition of management which most aptly meets the concept of management by objectives is, 'the active process of determining and guiding the course of a business towards its objectives'. Such a definition does not emphasize the economic approach of 'maximization of profits', for in real life very few businesses have this as their aim.

A programme of management by objectives for a business will contain the following main areas:

1. A strategic plan.
2. Tactical plans.
3. Controls to measure performances achieved.
4. The participation of subordinate managers in the planning stage, together with the development of appropriate control measures. By so doing they are committed to the achievement of the plan and the performance levels set, since they themselves helped to design and agree them.
5. A programme of training to overcome individuals' weaknesses and provide for a succession plan for future senior management.

Environment appraisal

Before setting up a management by objectives plan for the business, it is necessary to carry out a careful analysis of both the external and internal environments in which the business will operate in the future.

The external environment includes those factors outside the business which are not directly under the control of the manager; in fact they may be often beyond his control. Typical of the areas to examine are such factors

as future market prospects, competition from other businesses or other substitute products, changes in technology and their effects on marketing and production, the actions of Government, the state of the national economy as a whole, taxation and labour supply. From this analysis can be gleaned the opportunities for and threats to future profits for the industry as a whole, which will have a material bearing upon any future strategic plans for the particular business.

The internal environment—that is those factors which will influence the success of a business from within itself—must next be critically examined. This involves an audit of the financial position, existing performance levels, resources available and the skills of both management and work staff. From this appraisal should evolve a series of opportunities and threats to future profits which are open to the business. These are then evaluated to decide which are best suited to the particular business and to the resources and skills available. The process is shown in the form of a flow chart on page 209.

Strategic plan

The aim of a strategic or long-term plan is to determine the way the business should develop in the future. It will be for a specified period, usually five to ten years; the exact period will depend mainly upon the type of business, its degree of capital intensity, the rapidity of technological change to which it is subjected, and the duration of its production cycle. The oil industry, for example, has strategic plans for the next twenty-five years, whilst household appliance manufacturers plan only for two to five years ahead. In agriculture the time span of a strategy should take into account in addition to the main factors, the economic life of capital equipment available or becoming available. A period from five to ten years is an appropriate planning horizon for the agricultural industry.

A strategy (see diagram on page 209) for a business would contain:

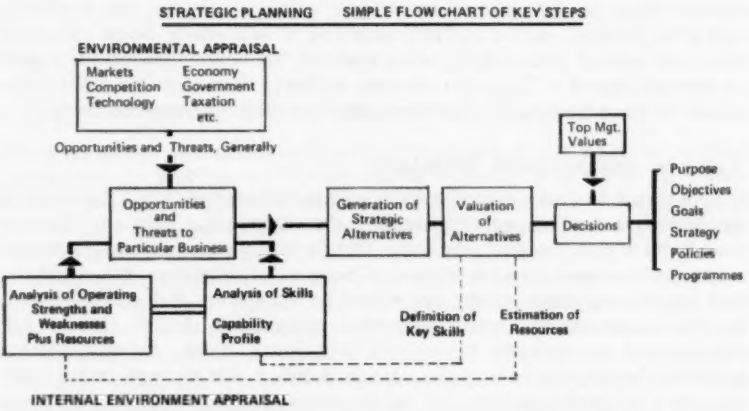
1. The purpose of the business.
2. A set of objectives.
3. A set of goals.

The Purpose. The individual aspirations of top management will decide what purpose is finally agreed. It will vary widely and could specify, for example, minimum profit or sales levels, or to build up capital. Other possibilities might be to survive as an independent business, to cater for special family needs, to grow in size, to provide a public service or to ensure security in the future. The following two examples will illustrate the concept of a purpose. The first 'To obtain a standard of living for self and family comparable with other professions and trades, whilst enjoying the amenities of country life'. The second, 'To double the size of the present business to enable a son to join it in ten years' time'.

Objectives. Most organizations and businesses purport to have objectives, but these are often very broad statements of intent which give little or no indication of exactly what results are to be achieved. Objectives, to be of any real value, should state clearly what is to be achieved and by when it is to be accomplished. They are often expressed as profits or returns on equity, sales forecasts, production targets or development projects, set to a time schedule by which they are to be completed.

Examples of objectives might be 'to increase profit per acre from £8 to £12 by 1972' or 'yields of not less than 1,000 gallons milk sold per cow to be reached by 1972'.

Goals. A series of goals is then prepared which state how the objectives are to be realized. These are the key areas where management must concentrate their efforts to ensure that the objectives are reached. They are prepared by carrying out a Key Tasks Analysis of the manager's own job. The analysis should describe the key tasks, specify the levels of performance to be achieved, decide what data and control measures are necessary to monitor the achievements set, and make suggestions or comments on possible improvements. The procedure should be gone through by all unit or department managers as well as top management. Goals to be realized may include the phasing of the increased performance desired, improved techniques which will need



to be adopted, any extra resources of equipment, buildings, men and finance required to attain the objectives, or even a different breeding and feeding policy for the livestock to reach an objective set. There are very many ways in which the objectives can be realized, so goals need to be designed to meet the specific circumstances of the particular business.

Tactical plans

The purpose, objectives and goals form the business strategy; once this has been agreed, tactical plans (policies and programmes) can be developed for this year and next year. During the environmental appraisal, major weaknesses may have been discovered which need immediate attention. Immediate action plans to overcome these weaknesses should be prepared as soon as possible.

Participation and control measures

Paper plans serve little purpose unless they are effectively put into practice. Neither will the planned results be achieved unless some means are included to measure periodically actual performance levels being realized against those planned. Control measures can be successful only if those subordinates who have the jobs to do accept them as fair. So 'Management by Objectives' plans involve subordinates in the planning stage and in developing and agreeing the control measures to be adopted. Once the strategy for the business as a whole has been agreed, each subsection, unit or department sets its objectives, performance levels and control measures, which are then agreed with the immediate superior. This applies to service departments as well as to production and marketing.

It is important to isolate the key tasks which will decide the success of the plan, and then develop simple control measures to provide checks to see that performance targets are being reached.

Updating of plans. The longer term the plan, the less accurate is it likely to be, so some system of reviewing must be incorporated. In agriculture, tactical plans can be updated monthly as actual results become available, and strategic plans can be updated quarterly or half yearly. Some industrial firms run tactical plans which, when updated, are rolled forward for a year or eighteen months. They also examine critically their strategic plans twice a year or more frequently if environmental conditions change suddenly.

Type of management structure

From what has been said about the system 'Management by Objectives' it can be seen that all managers throughout the organization have a say in what shall be done and how it is to be done. This form of participative management is absolutely essential to this system of business organization. It is also vital that top management is fully committed to the system and accepts that it has less authoritarian control over what will happen. Unless there is full commitment at all levels the system will break down. As management problems become more complex, group decision will become increasingly necessary if good decisions are to be taken. Management by objectives provides a complete system of management organization to enable group decisions to be made, acted upon and controlled.

This article has been contributed by **R. S. Boyer, N.D.A.**, who is Regional Farm Management Adviser for the National Agricultural Advisory Service in the South Western Region.

FARM INCOMES IN ENGLAND AND WALES

A Report based on the Farm Management Survey for 1968

Average net income per farm was depressed by poor weather on most types and sizes of full-time farms in 1968 but is expected to recover in 1969. This is shown in **Farm Incomes in England and Wales in 1968**, published by H.M.S.O., price 16*s.* 6*d.* (by post 17*s.* 6*d.*). The Report is based on a survey of about 2,500 full-time farms in England and Wales and relates to a year ending, on average, about the middle of February, 1969.

Three farms in the Vale of Clwyd, Denbighshire prove that substantial benefits can be gained from co-operation

Co-operation in Practice

Co-operation calls for groups of farmers to get together with open minds and a will to do the job together

N. A. Jones

SHARING labour and machinery has been an accepted practice in the farming community for generations. Various chores requiring gang labour have been carried out by groups of farmers on a mutual basis and in the past such occasions as sheep gatherings on the hills and corn threshing on the lowlands were an important part of the social life of the community.

Mechanization has reduced the scope for labour sharing but has left a wide open field for co-operation in owning and operating machinery. It is now common practice for two or more farmers to share individually or jointly owned machinery on an informal basis, thereby deriving benefits from a lower capital commitment and lower running costs, especially where more sophisticated and costly equipment is involved. Still greater benefits are possible if the practice is extended to larger groups with a wider range of activities. It is possible to put such schemes on a formal basis with a set of rules that can help to avoid or eliminate misunderstandings and to resolve any differences that may arise. A formal scheme in one or a number of enterprises between three or more farmers can be grant aided by the Central Council for Agricultural and Horticultural Co-operation, while the N.F.U. sponsored Syndicates Credits Ltd. can assist in providing credit facilities for such projects.

Co-operation in potatoes

A typical example of a small successful scheme is that of Llanbedr Potato Growers in the Vale of Clwyd, Denbighshire. In this case three adjoining farmers, each with his own problems, found common ground for solving some of their different problems by co-operating in their potato enterprises. They were already members of the Clwdian Range Graziers Association and had, in the past, called upon each other for assistance occasionally. They were therefore well aware of the possible advantages of working together.

The three members of the enterprise

Mr. George Whittingham, Llanbedr Farm, with 157 acres and common grazing rights had a herd of 58 cows, reared replacements, carried a flock of 80 ewes and grew 19 acres of potatoes. His main problems were too heavy a work load for himself and two men, especially when sickness intervened, and a potato harvester that had become unserviceable and needed replacing, but the cost of an efficient machine could not be justified on the present acreage.

Mr. Llew Parry, Bryn Rhedyn, had two farms eight miles apart and totalling 150 acres. He grew cereals, eight acres of potatoes and carried a suckler herd of sixteen cows and a flock of 450 breeding ewes; the latter made good use of the common grazing. He found it necessary to intensify his business to counter the loss of a milk cheque after giving up milk production. He also found increasing difficulty in finding potato pickers and, before joining the group, was contemplating buying a secondhand harvester.

Mr. Bob Evans, Fron Goch, with 41 acres plus common grazing rights reared beef and heifer calves, weaner pigs, and carried a flock of sixty hill ewes. A small area of potatoes was grown for local retail sales. He needed to intensify his business to meet the ever declining income of such small farms and to ensure a reasonable livelihood for himself and his family.

An attractive solution for all three farmers was to intensify the livestock enterprises to release land for increasing the potato acreages, and to form a co-operation group to equip themselves with a high output harvester and ancillary equipment. Discussions along these lines led to the formation of a group under the guidance of the N.A.A.S. Regional Co-operation Adviser and the Welsh Agricultural Organisation Society. The scheme was acceptable to the Central Council and grant was made on the new equipment, while Syndicates Credits Ltd. provided for a loan over a four-year period.

Capital contributions were made by members in proportion to the proposed potato acreage. These amounted to 20 per cent of the net capital requirement, the remainder was borrowed. The half-yearly instalments on the loan are paid into the group account by members in the same proportions. Costs of maintenance and repairs are met out of the group account which is maintained at a minimum level by proportionate contributions as and when required. Tractors, trailers and labour used will be subject to direct balancing payments between members.

Aims

The aims of the group are:

1. to increase the total potato acreage from twenty-seven to approximately forty-seven acres;
2. to purchase equipment suitable to the increased acreage;
3. to formulate a common policy for choice of varieties, fertilizer dressings and weed, pest and disease control;
4. to bulk buy seed, fertilizer and sprays;
5. to adopt a high standard of dressing and marketing in labelled bags.

Applications for increased acreage quota have not met with the expected success but, after careful budgeting, it has been decided to complete the proposed increase by paying the excess acreage levy.

The new machinery purchased consisted of a sprayer and a high output harvester equipped with a bagger and an elevator for delivering loose crops into trailers. A planter, store elevator, haulm pulverizer and elevator digger were purchased from group members. The choice of varieties is carefully considered in order to spread the harvesting season as far as possible. The four acres of earlies and fourteen acres of second earlies reduce the acreage requiring attention during the maincrop harvest period. About half of the seed potatoes are home-grown while the remainder are purchased, if possible, from farms known to be free from eelworm infection. Fertilizers for potatoes and all other crops are bought in bulk, taking advantage of bulk discounts and early delivery rebate. Sprays are used for weed and blight control and for burning off haulms. These too are bought in bulk.

On the marketing side an agreed standard of dressing is accepted and potatoes are packed in 56 lb new paper bags bearing the legend 'Llanbedr Potato Growers' in bold print. Any potatoes not up to standard will be marketed in plain bags. Each member is responsible for marketing the potatoes from his land on behalf of the group. He is also responsible for storing the crop and for providing tractors and trailers for haulage on his own farm. A team of six or seven is required to give optimum output. The three members and their four men are able to cope adequately but casual help may be needed at times if other work calls for attention.

The proposed acreage represents approximately 20–25 per cent of the potential potato land on each farm and it is not considered advisable at this stage to increase the acreage beyond this figure. It is proposed, however, on the two farms not growing cereals, to grow potatoes two years in succession; this will reduce reseeding costs and probably the risk of a build-up of eelworm should they inadvertently be brought in, since an eight year break between crops is likely to be a more effective control than two of four years.

Daily maintenance and repair has been made the responsibility of one member. He will be responsible for daily servicing and also for repairs to be carried out as and when necessary; the cost of repairs are paid from group account. A firm of agricultural engineers has been engaged to inspect the machines annually and a written report will be made available to the members. It is hoped that these arrangements will lead to efficient machinery without undue worries for the members. The secretarial work is the responsibility of another member; he undertakes to keep all records, deal with correspondence, call management meetings and, when necessary, appoint an auditor, valuer or arbitrator.

Future development

It is considered that the present equipment and labour team are capable of dealing with at least sixty acres provided that the harvesting can be spread over a reasonable period. Negotiations have now been completed for the group to take over the potato enterprise of a neighbour; this will increase the total acreage to about sixty.

On the marketing side consideration is now being given to smaller packs such as 5 lb polythene bags but it is anticipated that there may be a growing demand for larger packs so 14 lb carrier type bags are also being considered.

Benefits from co-operating

1. The intensification programme of the livestock enterprises will cost approximately £400 per annum, mainly for extra fertilizer. This will enable the group to grow about nineteen additional acres of potatoes. Part of this cost is covered by increased quota but the remainder will be subject to the Excess Acreage Levy. After making allowances for this it is estimated that the average gross margin would be in the region of £85 per acre. The basic costs would remain unchanged so the extra profit could therefore be £1,615 less the cost of extra grassland fertilizer of £400. This represents a very acceptable profit of around £1,200.

2. The difference between the capital invested by the group and the capital that would have been required by the three members individually amounts to about £880. The co-operation grant of £400 brings the saving up to £1,280.

3. The cost of casual labour since co-operating is less than £20, while the cost for the new acreage based on previous figures is estimated at £200. This represents a saving of £180 per annum and the elimination of the problems associated with casual labour in this area.

The experience of this group to date leaves no doubt that there are substantial benefits to be gained from co-operation of this type especially under a Central Council Scheme for Agricultural and Horticultural Co-operation.

Success in a venture such as this merely calls for groups of farmers to get together with open minds and the will to co-operate.

The author of this article, **N. A. Jones,** is Deputy County Agricultural Adviser for the N.A.A.S. in Denbighshire.

THE GRASSLAND RESEARCH INSTITUTE

Subject Day 1970

The Subject Day will be on Thursday the 24th September and the title will be *Crop Conservation and Feeding*. On the 23rd September there will be a brief press conference, followed by a preview of the exhibits which will be on show the following day.

The exhibits will be open to the public from 10 a.m. until 5 p.m. on the 24th and will cover the whole range of activities from the production of crops for conservation and techniques of conservation to the management of stock in production systems using conserved feeds. Although the emphasis will be on the practical side the more theoretical aspects of the subject will also be covered by further exhibits in the laboratories.

Further details may be obtained from the Liaison Officer, at Grassland Research Institute, Hurley, near Maidenhead, Berkshire. (Tel. Hurley 363.)

This discussion, by R. J. Colyer of the Animal Husbandry Department of the University of Wales, on tail biting in pigs will be of interest to all intensive pig producers.

Tail Biting in Pigs

DURING the last two decades, alterations in the economic climate have brought about fundamental changes in the pattern of pig production. Substantial increases in the cost of food, housing, labour and capital have forced the producer to adopt a management-orientated approach towards his particular enterprise. This, of course, implies making the most efficient use of available resources in order to get the maximum return on invested capital. The demand for increased technical efficiency in the face of rising production costs has led to the development of highly intensive controlled environment pig systems where building space is used to the best advantage. One of the main results of intensification has been a dramatic increase in stocking density within the controlled environment fattening house. Clearly, the higher pig population per fattening pen will result in a greater throughput of pigs, and consequently a lower building depreciation cost per pig. In spite of the obvious economic advantage of reducing housing costs, the achievement of a high stocking rate is not without its problems. In particular, the author has observed that the gathering of large numbers of pigs on a relatively small floor area often sparks off the highly undesirable vice known as 'tail biting'. The incidence of tail biting has increased in parallel with the development of intensification to the extent that it is now one of the most common disorders of the growing pig. It is reasoned that in the absence of straw or sawdust the pig has no material upon which to exercise his natural tendency to gnaw, and consequently he may be attracted to the tail of a neighbouring pig as a substitute.

Thus tail biting is started by an individual pig chewing the tail of a neighbouring animal until eventually blood is drawn. The irritation produced by the wound inflicted by the aggressor pig causes the victim to move around the pen, thereby disturbing its other occupants. This movement, together with the sight and smell of blood, arouses the interest of the other pigs in the pen, bringing about a general attack on the wounded tail. The gnawing of the tail by the remainder of the group results in it being completely bitten off, leaving behind only a bleeding stump.

Apart from the obvious stresses imposed by the tail biting upon a group of pigs, direct economic losses may be incurred. The entry of pathogenic bacteria into the wound may give rise to severe paralysis and death, and even if this does not occur, the carcase of the pig is often rejected at the abattoir. Obviously an understanding of the factors responsible for the onset of tail biting is essential if steps are to be taken to reduce this vice in intensive piggeries.

Nutritional causes

There is a considerable difference of opinion among research workers and farmers concerning the circumstances causing tail biting. Whilst some workers feel that high stocking rate and the loss of bedding may be a major cause, others suggest that nutritional factors may play a leading part. It is possible, from the bewildering amount of evidence on the subject, to isolate those factors due to nutrition and those due to the housing environment.

A recently published large-scale survey shows that about two-thirds of tail biting cases are in some way associated with nutrition. In recent years nutritionists have stressed the importance of feeding high energy, low fibre, rations to growing pigs. By reducing the fibre content of the ration, digestibility is improved and the pigs consume the minimum amount of non-nutritious material. Technically such rations are ideal for growing pigs, promoting rapid rates of growth and good feed conversion efficiency. It is, however, possible that the low fibre levels in modern pig rations are such that the appetite of the pig is unsatisfied after a meal. This results in restlessness and irritability which may precipitate tail biting. For this reason some advisers are recommending that rations for growing pigs should contain not less than 3 per cent fibre. There is also considerable evidence to suggest that the protein quality and the mineral content of the ration may have some bearing on the problem. Environmental factors being equal, it seems that pigs fed on diets containing a low level of animal protein are more prone to tail biting than those fed on diets with a high animal protein level. This is particularly the case in heavy hog production where pigs are often fed *ad lib.* on diets rich in vegetable but low in animal protein. It is possible, therefore, that protein quality may contribute towards causing tail biting, as it is well known that vegetable proteins are deficient in the essential amino-acids required by pigs for efficient production. In addition to this, it has been shown that the mineral content of the ration has often considerable bearing on the incidence of tail biting. Whilst it is rather rare to find inadequate calcium and phosphorous in conventional pig rations, the salt content may not be sufficiently high. Deficiency of salt tends to cause iritability and may, therefore, assist in causing tail biting. Any food containing under 0·5 per cent of salt is suspect and many advisers feel that levels should be raised to 0·75 per cent for complete safety.

Environmental causes

In spite of the evidence concerning the effects of inadequate nutrition on tail biting, in a large number of cases, the occurrence of the vice may be directly attributed to errors of management and environment. Within a pen of pigs any factor or series of factors which distrurb the normal pattern of behaviour may bring about tail biting. Although the pig is an active animal by nature it is normally willing to sleep for four-fifths of the day provided the environment is satisfactory. Where the comfort of the pigs is disturbed by unsatisfactory atmospheric conditions, they become restless and uneasy. The environment within a piggery is determined by a number of factors of which the most important is the level of stocking. At high stocking densities, particularly when associated with floor feeding, the temperature and humidity of the insulated building will rise and unless ventilation is adequate, considerable stress will be imposed upon the pigs. Associated with the rise in temperature and humidity is a substantial increase in the carbon dioxide and ammonia

content of the atmosphere. Under these circumstances the level of activity of the pigs is reduced; they become uneasy but do not actually start tail biting. It is suggested, therefore, that overcrowding and high humidity are not, by themselves, the cause of tail biting, they merely contribute to the cause if other factors are involved. In the opinion of the author, dietary imbalances, insufficient water, the presence of external parasites such as mange-mites and, above all, boredom will precipitate tail biting where environmental conditions are inadequate.

As already stated, pigs are active socially inclined animals and when forced to exist under what are fundamentally unnatural conditions they are bound to find life a little tedious. In the absence of bedding, and under conditions of enforced inactivity, the pig will often play with the tails or the ears of his neighbours as a means of alleviating boredom. In this context it is interesting to note that tail biting tends to occur more frequently at week-ends when visits from farm staff are less regular! Recent research work carried out in the Netherlands indicates that the provision of a small amount of straw in each pen will provide diversion for the pigs and will over-ride the adverse effects of poor ventilation. In practice, one bale of straw per 100 pigs should be sufficient to fulfil this objective, and thus reduce the incidence of tail biting. The same experiment showed that by maintaining the building in complete darkness the activity of the pig was reduced by 20 per cent. In this respect social contact between animals was lessened and, in consequence tail biting reduced, although to date there is insufficient evidence to suggest that darkening of fattening pens should become routine husbandry practice. Using straw in piggeries is often difficult for technical and managerial reasons. Where this is the case, the pigs may be provided with other forms of diversion in the shape of chains or rubber tyres suspended from the roof of the building. Such 'toys' have proved most successful in houses where the practice of 'floor-feeding' is followed. There is some evidence to suggest that the size of a group of penned pigs may be concerned with the onset of tail biting. For instance, Spillers Ltd., at Middle Aston, have reported that with conventionally ventilated houses, groups of below twenty floor-fed pigs tend to be less prone to tail biting than groups which exceed that number. This would indicate that where a serious outbreak of tail biting occurs in a large group of pigs, pens should be subdivided in such a way as to reduce group size. This should be accompanied by an increase in ventilation rate, thereby decreasing the level of humidity within the building. Many studies have been carried out on the interaction between temperature and ventilation rate in order to establish optimum environmental conditions commensurate with growth rate, feed efficiency and the reduction in incidence of social 'vices'. It appears that in a well-insulated house, the temperature should be maintained at 21°C (70°F) for weaner pigs, falling gradually to 16°C (60°F) by the time the pigs reach 200 lb weight. The ventilation arrangements should be such as to allow the removal of 60 cubic feet per minute per 200 lb pig in the summer months, provision being made for reducing the ventilation rate during the cooler parts of the year. The accurate installation of a ventilation system is of fundamental importance. It has been shown that the tail biting may be started in pens where isolated pockets of stale, humid air are allowed to accumulate. Thus it is vital to ensure that the ventilation system allows air movement throughout all areas of the fattening house without creating draughts.

Cases are often reported where tail biting has occurred in spite of all the necessary precautions being taken. Investigation of these cases sometimes indicates that it has been started by one particular pig which, for some reason, has developed pronounced cannibalistic tendencies. Provided this animal can be quickly removed from the pen before the outbreak reaches 'epidemic' proportions the remaining animals will usually return to normal activity. Frequently the cannibalistic offender is the 'runt' of the group and will continually create disturbances if allowed to remain in the pen. He should, therefore, be removed from the group and isolated as soon as his antagonistic behaviour is spotted.

Docking

In the past some producers have adopted the practice of removing the tails of young seven-day-old pigs, to prevent the onset of tail biting in later life. Unfortunately this procedure is rather unsuccessful as the attention of offending animals is often directed towards the ears or legs of their neighbours. Furthermore, the Report of the Technical Committee on the Welfare of Animals kept under Livestock Husbandry Systems (Chairman F. W. R. Brambell)* commented unfavourably on this practice. In fact, the recently published Codes of Practice† stipulate that docking should not be carried out unless prescribed by a veterinary surgeon.

It will be clear from this discussion that the vice of tail biting is not attributable to any single cause, but to a mixture of nutritional, environmental and social factors. As the economic facts of life demand that pig production becomes more intensive, those involved in the industry may become progressively more concerned with the integration of 'pig sociology' with technical efficiency.

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*Available from H.M.S.O. (*addresses on p.* 248) price 7*s* 6*d*. (by post 8*s*.)

†Codes of Recommendations for the Welfare of Livestock. Code No. 2. Pigs. A single copy may be obtained free from the Ministry of Agriculture, Fisheries and Food (Publications), Tolcarne Drive, Pinner, Middlesex. HA 5 2DT

The views expressed in this article are those of the author and not of the Ministry of Agriculture, Fisheries and Food

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Royal Smithfield Show to stay in London

The Royal Smithfield Show and Agricultural Machinery Exhibition will continue to be held in London, the Show's Joint Committee has announced.

The Joint Committee, representing members of the bodies which organize the exhibition —the Royal Smithfield Club, the Agricultural Engineers' Association and the Society of Motor Manufacturers and Traders—said that an exhibition of the international stature of the Royal Smithfield must be held in the London area.

This year the **Royal Smithfield Show** will be held at **Earls Court from 7th to 11th December.**

J. F. Hearne, B.Sc., F.R.I.C., a
Principal Scientific Officer with the Food Standards, Science and Safety Division of the Ministry of Agriculture, Fisheries and Food, talks about

Canning Today

AT its simplest, preservation by canning involves placing the prepared food into a can, together with any syrup, brine or sauce, exhausting air from the food, hermetically sealing the can, subjecting it to heat to cook and sterilize the contents and, finally, cooling.

Behind this seemingly simple schedule lie the accumulated techniques of a century and a half since Nicholas Appert devised his process for heat preservation of foods in 'stout glass bottles', since Peter Durand took out English patent 3372 in 1810 for the use of tin containers and since Donkin and Hall applied the new procedure of processing in metal containers. However, the industry as we know it is largely of this century, during which period can making and canning have attained a remarkable degree of precision and reliability. Despite all the technical changes which have recently taken place canning is far from static.

Changes in the tin can

Foremost are the changes which have taken place in the tin can itself. Few people opening food cans today appreciate that they differ markedly from those of a decade or so ago. They look much the same but revolutionary technological changes have taken place in their components and structure. Primarily these refinements derive from the economic fight for a place in the food market, but there is also a need to be less dependent on strategically vulnerable tin supplies and a desire to forestall potential alternatives such as aluminium and plastics.

The aim is toward cheaper cans that can be filled and processed at ever greater speeds; some smaller cans are now handled at rates in excess of 800 per minute and they fly through the closing machines faster then the eye can follow. To attain such speedy throughput demands not only superb can making and canning equipment but also precisely made tinplate to match. Within the technical limitations imposed by production needs and the rigours of distribution, the trend has been to cheapen the food can by reducing the thickness of both the steel plate and its tin coating. Formerly all tinned plate used for food cans was 'hot dipped', the prepared sheets of steel strip being passed through baths of molten tin. Although excess tin was removed from the plate by passage through mechanical devices, the tin coating remained thicker than was really necessary for normal needs.

Hot dipping has now been largely replaced by electrolytic deposition of tin on the steel plate. This is a more precise process and it is possible to adjust the thickness of the tin coating to meet specific needs. Further, it is possible to apply differing amounts of tin to the opposing faces of the sheet, since the coating needed on the inside to protect the food may differ from the external coating required to protect the can from atmospheric corrosion. 'Differential coating' is the term used here and a modern food can might typically have 0·5 lb of tin per basis box (this unit of measurement is equal to 31,360 sq. in.) on the inside and 0·25 lb on the outside. The electrolytically tinned surfaces may receive further chemical treatment and some of these treated surfaces will have special features, for example, showing less dark staining with products such as canned meats. By using new rolling techniques known as 'double reduction' thinner base plates can be produced, some as thin as six thousandths of an inch. Some of these tin sheets can be be of a very high tensile strength but, being somewhat brittle, they are mainly for special packs such as beer and soft drink cans.

Much interest centres on easy opening packs that will dispense with the need for keys or can openers, particularly devices which will enable the complete end of a can to be easily torn off. At the moment easy-to-open ends can be made only in aluminium, and because of corrosion problems they can be used only with tin plate bodies in a few instances such as canned beer and soft drinks.

In passing it might be noted that the familiar contour rings on can ends are an integral part of can design; they help to counter the high internal pressures that may develop within the cans during processing because of expansion of residual air in the can. Other changes in can structure are the use of seam solders of much higher lead content than hitherto, and improvements in can lacquers, particularly in their resistance to abrasion.

The latest of possible alternatives to tin plate are tin-free steels, which originated in Japan. They comprise steel sheets with either a chromate/phosphate treatment or a very thin chromium plating plus a chromium oxide layer. Their application to food canning is being studied, but, since tin-free steel cannot be soldered, any foreseeable use would seem to be limited to deep drawn cans (meat, fish, etc.) and the seamed-on ends of cans. In the United States beer cans are made from this material by welding or using an organic adhesive to form the side seam.

Preparation of foods for canning

Preparation of foods for canning is not basically different from that used for domestic cookery, except that the operations are conducted mechanically. The foods may need to be cleaned and washed, unwanted parts such as pea pods or the skins of root vegetables must be removed, and the food may need to be cut into suitably sized pieces. But two further stages may be necessary; vegetables may need to be scalded in steam or hot water to soften the tissues, to inactivate ensyme systems and so fix the colour of the food, and to remove dissolved or entrained gasses from the food tissues since these may interfere with thermal processing and favour internal corrosion of the can. Liquor—syrup in the case of fruits, brine in the case of vegetables, or gravy in the case of some meats—may be added.

The suitability of the raw material for processing provides the key to quality. The stage of maturity may—as with green peas—be quite critical, and the time of harvesting may be selected on the basis of physical or chemical tests. The shape, as with carrots where the stump rooted varieties are preferred, may be a decisive feature of the canning operation. Irregularities of shape may need to be avoided to ensure optimum yields in mechanical operations such as peeling. The material should be capable of withstanding the heat processing with suitable retention of shape, colour and texture; the attainment of these ideals depends on the choice of suitable varieties, suitably grown. An illustration of these considerations is the growing of new potatoes for canning, a comparatively recent demand. The processor wants small potatoes $\frac{3}{4}$–$1\frac{1}{2}$ in., with the texture and appearance of the freshly dug immature new potatoes available in early summer. The National Vegetable Research Station has explored the possibility of getting the right size and kind of potato by limiting the space the plant occupies by timing the planting and by the selection of suitable varieties.

Processing

Thermal processing falls broadly into two categories:

1. heating at atmospheric pressure in boiling water for 'acid' products such as fruits having pH below 4·5;
2. heating under pressure, usually in saturated steam, at temperatures up to 127°C for products such as meats and vegetables.

For selected processing temperatures the time of heating will depend on the size and shape of the can and the nature of the contents, i.e., whether or not they are homogenous, solid or viscous, or whether they are processed stationary or with rotation or agitation of the can; there is an impressive mathematical basis to support process formulation.

During recent years there have been many variants or alternatives to the older retorting procedures such as aseptic filling, agitation retorts and hot air sterilizing. The most widely adopted of these modern developments, particularly in Europe, has been the hydrostatic pressure cooker, in which the pressure in the heat processing chamber is maintained by a head of water of about 15 metres. The most recent versions cater for rotating the cans and for the processing of foods in glass jars.

In a few instances thermal processing alone may fail to give the required degree of protection to the product while retaining quality, since the heat process may not wholly eliminate thermophilic (heat loving) organisms. In such instances a measure of reinforcement can be obtained by the incorporation of antibiotics of which nisin alone is currently permitted in canned foods in Britain; nisin lowers the heat resistance of thermophiles. The Preservatives in Food Regulations 1962 allow the use of nisin in canned food which, incidently, is defined therein as food in a hermetically sealed container which has been sufficiently heat processed to destroy any *Clostridium botulinum* in that food or container or which has a pH of less than 4·5.

Contribution of canned foods to the diet

Canning converts seasonal perishable agricultural produce into ready-to-eat or readily-prepared stable foods that are well suited to modern systems of food marketing and having most of the qualities sough tin convenience foods for home and large-scale catering.

Their place in the diet is discussed in the 1967 Annual Report of the National Food Survey Committee, which listed for the first time the national average contributions made by canned and other convenience foods to the energy value and nutrient content of household food consumption. Canned foods provided about 4 per cent of energy value, about 7 per cent of protein, and—among other nutrients—nearly one tenth of vitamin A and vitamin C.

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Colorado Beetle in 1969

Thirty-one beetles were discovered in England and Wales during the year. This was more than is usually expected but considerably less than the exceptionally high 92 in 1968. 25 of the beetles were found on ships, including 2 on quaysides near ships—13 from France, 8 from Spain, 3 from Portugal and 1 from West-Germany. 4 were associated with imported produce—2 from Spain (1 in endive and 1 in canned peaches), 1 in lettuce from France, and 1 in blackberries from Yugoslavia. Of the 2 remaining beetles, 1 was found on a school playing field and the other in a greengrocer's shop; with both these incidents it was not possible to trace the country of origin of the beetle.

No breeding colony has been found in England and Wales since 1952.

The Ministry is grateful to everyone who reported the presence of Colorado beetle and asks for the continued help and vigilance of the public in the campaign against this pest.

H. W. Janson

Eat British

THE AUTHOR

Daphne MacCarthy

Our classical meals can compare favourably with any to be found in the world.

WHY should you eat British foods you may well ask; what have they got to offer that their imported rivals have not? They are just as fresh, of good quality, give value for money, and producing them can help to improve the economy of this country. And it is rare that an imported foodstuff can offer something that we cannot equal or better ourselves.

Take dairy produce as just one instance of what, under the British label, we can buy. Our milk is excellent and no one denies it. Butter made from the cream taken from milk is pretty good, too; and competes for the attention of the housewife—masculine shopper as well—with Danish or French or any other imported variety. There are several kinds of British butters from which you could, if you would, make a selection; there are English, Welsh, Scottish and regional varieties such as Wensleydale, Shropshire, Devon and Cornish. Each, like all different butters, home or imported, has a texture and flavour particularly its own, and only when you have sampled them all can you choose your own particular best.

Then look at our cheese. So you prefer strong flavoured sorts? Then what is wrong with Stilton, deservedly nicknamed the 'King of cheese'? This used to be regarded as a seasonal cheese, one that was produced every Christmas and on high days and holidays. Now it is to be had all the year round and worth getting at any time. Of course, if you like milder kinds of a creamier texture, have you sampled the excellent range of Scottish cheese which is being made commercially nowadays? These include some superb varieties with histories dating back hundreds of years, like Caboc and Crowdie.

The 'King of Cheese'

And home-produced meat. There is little to equal it anywhere in the world. It does not need highly flavoured sauces and pickles to improve the flavour, which is why our traditional main-course dishes are simple and basic. If you have ever had to live on a diet of elaborate fare then you already appreciate just how delicious a steak and kidney pudding, mixed grill or Irish stew can be.

We might not be able to produce as many different kinds of fruit as do some places, but those we do grow are worth buying. For a small country we have reason to be particularly grateful to our apple producers, who have made English apples lead the world for quantity and quality. We do not stagnate either. Constant experimentation is carried out not only with apples but with all fruits to improve marketability, flavour and standard. Our summer fruits, many of which perish quickly, are delicious, and, thanks to modern marketing techniques, reach the shops in prime condition. Surely, it is no more than common sense to appreciate the fresher these are the better they are. With some imported commodities, foreign growers often cannot beat this time element no matter how careful they may be.

Freshness plays an important part in providing us with the top-quality vegetables we purchase. After all, we might not all be fortunate enough to be able to go into our gardens to pick them when the morning dew is lingering on the leaves, but we do nevertheless get our market produce in peak condition. The only trouble is that we often consider it as our mundane fare and turn to imported for the more unusual. This is unfair to British vegetables. Our growers are willing, and able, to provide us with quite an assortment of the rarer vegetables; but, with practical common sense, they do want to make sure they will be bought. How about salsify, kohlrabi, seakale, cardoons, okra, globe and Jerusalem artichokes, to name but a few? These could be available in larger quantities, but on the whole few of the average housewives buy them. The British housewife is still a bit chary of trying anything out that she has not known from her cradle; if variety is the spice of life, this is a short-sighted policy that should be remedied for her own sake if for no other reason.

Actually, we can be a bit noddle-headed when it comes to shopping. Take brown eggs now. There are brown eggs to be had, usually dearer than white or speckled ones, and these pander to the more prejudiced amongst us. What is inside the shell, the nutritional part, is just as good whatever the colour of the shell, but gullible shoppers don't seem to think so. None of us is perfect, and that goes for our producers and packers as well as for the shoppers. Sometimes fresh goods are not packed or stored as well as they should be; apples are bruised, soft fruits pulped, potatoes turned green, and, sometimes, retailers bundle different grades of produce in together. This is all wrong. It ought to be remedied and this is something each of us can do by complaining strongly whenever there is justification.

Some retailers stock as much if not more imported than home-produced foods of various kinds. Of course, you get producers who want to sell more; but apart from a few commodities, such as milk, little is spent on publicity, while our competitors spend vast sums every year in getting across to the British public just how excellent their foods are. Not so the British farmer; he is perhaps too complacent, sits back and blandly assumes that Mrs Housewife will buy his foods without any, or very little cajoling. So she will, up to a point, as long as it is sold at competitive price and quality; but, as any public relations expert will tell you, getting the message across has to be paid for, like it or not. When advertising does (and it can) result in increased sales, the money will be returned time and again to the producers, making it a sensible investment.

Now that millions of tourists are visiting our shores we should take a pride in providing them with good British food so that when they return to their own countries they can praise it, instead of wondering where it can be found. And, make no mistake about it, we can offer them some superb meals, varying from region to region. Aberdeen Angus steak, lamb from the hills of Wales, Yorkshire pudding, Bath buns, bacon-filled Sussex pudding, Norfolk dumplings, Devonshire apple cake, Lancashire hot pot . . . the list goes on and on, but so often you find few if any available. It is a pity that so many restaurants and hotels will insist not only in putting their bills of fare in French but using French names for our own recipes too. We have no reason to be ashamed of anything we produce; our classical meals can compare favourably with any to be found in the world. Perhaps for the sake of spreading abroad the flavour of good British foods we should protest at this custom whenever we see it and demand the use of the English language!

In 1968 the total value of British agricultural output was nearly two thousand million pounds. We produced about two-thirds of our temperate foods. We could produce more—and sell it, because British foods *are* good. Go on, give yourself and Britain a boost—eat British foods.

This article has been contributed by **Daphne MacCarthy** who is an Advisory Consultant for the British Farm Produce Council, author and broadcaster; she is currently engaged in writing a book on British food.

Farm secretaries help the farmer to be more of a manager and less of a clerk

Secretarial Services in Farming

B. H. Davey

It is now an accepted cliché in farming and agricultural circles that there will soon be more people catering to the needs of farmers than there are farmers themselves. In recent years, there has been a proliferation of organizations and institutions serving agriculture, both private and quasi-official, such as the Home Grown Cereals Authority, the Meat and Livestock Commission and the Agricultural, Horticultural and Forestry Industry Training Board. For the individual farmer, traditionally shy of paperwork, this means more form-filling in addition to the normal run of farm office management tasks such as the payment of bills and wages, computation of tax returns, completion of various returns to the Ministry of Agriculture (e.g., the annual and quarterly agricultural censuses and applications for grant and subsidy payments), the compilation of stock movement records and the preparation of management records. At the same time as the clerical burden on farmers has been increasing, another development has occurred which can lift some of this burden from their shoulders; this is the growth in the availability of secretarial services in agriculture.

General development

In a way, the increase in the number of firms offering a farm secretarial service is no more than a part of the general development of specialized office services during the 1960s. Just as the manager of, say, a small town business can call on specialized firms for assistance with such elementary tasks as the typing and copying of documents as well as the more sophisticated services offered by computer bureaux, so can the farmer now draw on the services of the farm secretarial firms to help with the running of the farm office. Farm secretaries first came to prominence about ten years ago when a firm opera-

ting from Devizes, Wiltshire won a national business enterprise competition. Now, however, the farm secretary's mini-van is a commonplace sight throughout the country.

However, although the growth of farm secretarial services can be regarded as part of a wider development, there are a number of factors, peculiar to agriculture, which account for the increasing number of firms offering such a service. In the first place, all but a few large farmers run businesses which are too small to justify the employment of a full-time secretary. In other small businesses, the owner's wife often helps to run the office, probably a reflection of the fact that it is not unlikely she was employed as a shorthand-typist prior to marriage; but this rarely seems to happen on farms. Yet, as already noted, farmers have a considerable volume of routine office tasks to cope with and these tasks are increasing rather than decreasing. A report recently published by two economists at Reading University has cast some light on the amount of time farmers spend on clerical work. Although the sample of farms on which the analysis was based was very small, the results suggest that farmers may spend from ten to almost twenty-five per cent of their time on purely clerical work. The average over the whole sample of sixteen farms was fourteen per cent. It is clear, therefore, that farmers spend a considerable proportion of their time on routine office work and that they might be more profitably employed on jobs of a strictly managerial nature. The employment of a farm secretary on a part-time basis would be one way of achieving this.

Management records

An important factor is the increasing awareness on the part of farmers of the value that accrues from having an adequate set of physical and financial records on which to base management decisions. The keeping of proper management records places an additional burden of office work on the farmer, since he needs not only to arrange for a record of his financial transactions to be kept in a form suitable for management purposes, but also a substantial amount of physical data covering, for example, records of feed and fertilizer use by different enterprises, records of the yields obtained from his crops and livestock and a record over the year of the amount of labour engaged on different activities. The collection of this information is a major cause of the growing demand for farm secretarial services.

Management advice

So too is the growing demand for farm management advice, not only from the National Agricultural Advisory Service, but also from semi-public bodies such as the Milk Marketing Board and private firms, including the private farm management consultants. In the early days of farm management advice, it was not unusual for the adviser himself to take away from the farm such raw physical and financial data that were available and in his own office put them into the form required for management analysis. Routine work of this kind is, of course, an inefficient use of the adviser's time. As more and more farmers began to request management advice, it became impossible for the adviser to compile the information he needed by himself. Nowadays, the farm management adviser often expects that the farmer will be able to hand over a well presented set of financial accounts supported by adequate physical records; indeed, the availability of this information is rapidly becoming indispensible for management advice.

Farm business recording scheme

But perhaps the greatest stimulus to the expansion of farm secretarial agencies was given by the introduction by the Ministry of Agriculture in 1965 of the Farm Business Recording Scheme*. In this scheme, farmers may receive a basic grant of up to £70 per year; in addition, a supplementary grant of £30 is payable when gross margin summaries have to be prepared to keep farm business records. Farmers participating in the scheme have to use an outside firm of qualified people for record keeping. The point to note here then, so far as the growth of secretarial agencies is concerned, is that the grant is paid to the farmer for employing not a full-time personal secretary but a recognized secretarial service. Thus, secretarial services expanded in both numbers and size concomitantly with farmers' natural desire to derive full benefit from the recording grant.

Organization of services

Turning now to the organization of farm secretarial services, this varies from the small 'one-or-two-girl band' serving a few farmers in a highly concentrated area, to the large multi-county agencies catering for the needs of several hundred farmers. No matter what the size of the agency is, however, the general principle is the same, that is to provide farmers with a secretarial service carried out on the farm by trained secretaries capable of undertaking all the recording and secretarial work that the farmer-client may require. Farm secretaries are thus a mobile service travelling around from farm to farm spending a day or half-day with each client each month or fortnight depending upon the level of service required.

The type of work undertaken by the agencies falls into several broad categories. In the first place, the secretary may carry out the ordinary office work which is involved in running any business; this would include the typing of letters, filing of correspondence, the payment of accounts and the ordering of supplies. Secondly, she may keep certain routine records required on all farms, such as the livestock movements record and the information needed to calculate wages for the hired workers, as well as their PAYE, national health insurance contributions and other deductions from gross earnings. She might also make up the wage packets. Thirdly, the secretary may keep the records needed for the preparation of the accounts, building up at each visit from such sources as cheque book stubs, bills, invoices and sales receipts the data which the farmer's accountant needs in order to prepare the annual profit and loss statement for the Inland Revenue. There are obvious advantages in having a properly and regularly kept financial recording system. Not only does it make easier the job of the accountant at the end of the financial year but it also provides information which can be used by the farmer to keep a check on the progress on the farm business throughout the course of the year. The organization may also undertake responsibility for the preparation of special management records, including those required of participants in the M.M.B.'s. Low Cost Production Scheme and the Ministry's own Farm Business Recording Scheme. Finally, in addition to helping individual farmers with secretarial assistance, the farm secretary may also service the operations of small group ventures involving several farmers, such as machinery syndicates and buying and selling groups.

*Information and application forms can be obtained from the Ministry's Divisional Offices.

To provide a supply of trained secretaries to staff the expanding secretarial agencies, a number of county farm colleges have recently introduced short training courses for farm secretaries. Many of the girls who take these courses are already qualified shorthand-typists, not necessarily from farming or rural backgrounds, who are seeking a career closely related to farming. The curriculum normally includes some basic training in agriculture as well as specialized instruction in the various tasks the farm secretary is expected to undertake on behalf of her farmer clients.

Conclusion

The need for and growth of farm secretarial services is due primarily to the increasing volume of paperwork with which farmers are now burdened, and to the greater emphasis on farm management analysis and planning on the part of both individual farmers and their advisers. The sight of the farm secretary's mini driving into the yard is now a frequent and welcome sight as more and more farmers begin to appreciate the advantages of employing one of the farm secretarial agencies.

So far as the farmer is concerned, the farm secretary is an invaluable aid in taking over much of the routine clerical work involved in running his business and yielding the bare bones of farm records, as well as preparing the management records that are necessary for sound decision-making. Farm secretaries thus help the farmer to be more of a manager and less of a clerk; they are also an important link in the farmer-adviser relationship for they can take responsibility for the preparation of the information required by the adviser as a basis for his management advice. From the secretaries' own point of view, much of the work may be of a routine and mechanical nature. However, she does have the advantage over her counterpart in an urban office block of travelling around the countryside, meeting a variety of people and carrying out her duties in a range of environments.

B. H. Davey, B.Sc.(Agric.), M.Econ., is a Lecturer in Agricultural Economics at the University of Newcastle upon Tyne. Formerly an economist at the Ministry's Headquarters in London, he has recently returned from a year of study in the United States of America.

Remember Bees When You Spray

Crop sprays can kill bees and other beneficial insects. Bees are valuable pollinators and their presence can result in substantial increases in the yield of fruit, field beans and certain of the brassica seed crops. In their own interests, farmers, fruit growers, spraying contractors and beekeepers should co-operate to ensure that bees are never unnecessarily exposed to danger.

Farmers and spraying contractors can avoid the killing of bees by using the less harmful types of insecticide—granular forms where possible—and by taking the following precautions:

1. Never use insecticidal sprays or dusts on, or apply weed-killer to, open blossom in orchards or on crops in flower.
2. Apply sprays which are toxic to bees early in the morning, or, better still, in the evenings to give longer for dispersal before the bees become active.
3. Avoid spraying in strong wind when spray may drift on to hedgerows or adjacent fields where bees may be foraging.
4. Never dump waste chemicals or used containers in ponds, waterways or ditches which bees (and other animal life) may use as drinking places. Always observe directions and warnings given on labels of containers of chemicals.

Beekeepers should act to protect their bees by asking neighbouring farmers and fruit growers to give them adequate warning before spraying takes place.

Management of the Single-suckler Herd

T. L. Powell, *Liscombe Experimental Husbandry Farm*

In recent years there has been an improvement in the financial rewards obtainable from a beef breeding herd. As a consequence many farmers have been encouraged either to expand existing herds or to introduce the enterprise on to the holding.

In the usual situation where the output sought is one calf per cow per annum, it is essential that the product is of good quality and obtained at the minimum cost. In other words, animal management must be of a high standard. Because of the wide variety of conditions under which herds are kept, systems of management are necessarily diverse. However, there are general principles of good management and it is these which will be described in this article. Much of what follows is based upon experience and information gained at Liscombe where the herd is composed of Devon and Devon x Friesian cows.

Breeding

The importance of using a good quality bull cannot be over-emphasized and no more will be said on this point other than that many breeders are using all the means at their disposal to provide the right type of sire.

Ideally, a cow will calve at intervals not exceeding 365 days. In practice, however, longer calving intervals arise and the reasons are by no means clear. Nutritional factors are often implicated and, as a general rule, cows should be rising in condition on joining with the bull. Over fatness should be avoided but this is unlikely to be a problem with cows in early lactation.

Five per cent is not an uncommon figure for the incidence of barrenness. In a number of cases, failure to conceive is due to functional disorders which can be remedied by suitable veterinary treatment. A reduction in the number barreners might be effected by leaving the bull with the cows for a longer period but suitable management of the late born calf does not correspond with that of the earlier born. In herds where barrenness is a major problem, pregnancy diagnosis by a veterinary surgeon is a worthwhile investment. In the normal situation, careful observation of the herd in the breeding season should detect barreners and provide guidance on calving dates for the other cows.

Knowledge of the calving date is of considerable value, particularly in the spring calving herd, because valuable fodder can be utilized in accordance with the needs of the pregnant cow. On the question of noting service, we

find this much easier with our cross bred than pure bred cows. We have investigated various mechanical devices for detecting service but, as yet, none of these have proved entirely satisfactory.

Our cross bred cows calve down first at a little over two years of age when we like them to weigh from 7½ to 8 cwt. Growth rate from birth must, therefore, be reasonably high but there is no evidence to suggest that, as a consequence, lifetime performance of the suckler cow is adversely affected. Date of the first calving is of some importance because we find later calvings unlikely to advance more than six weeks from this date.

Reducing calf losses

Some mortality amongst calves in early life is inevitable but the aim of good management should be to keep this below 5 per cent. Disease problems become more acute when calves are reared indoors for the first weeks of life. It is in the indoor environment that white scour assumes considerable importance as a health hazard.

During the last three years, our February—April calving herd has calved in the house into which it was brought the previous December, but shortly after parturition the calf and its dam have been turned out to pasture so that white scour may be more readily controlled. We are not satisfied with this practice, however, in that the housing accommodation does not give the degree of pasture resting we should expect. Accordingly, when this article appears we will have attempted to rear calves indoors from birth until turnout in late spring. It is hoped that experience of treating white scour will serve us in good stead and we have acted on the advice that healthier conditions should exist in pens holding five or six cows rather than much greater numbers.

Excessive milk intake is often suggested as a contributory factor in white scour outbreaks but we find little difference in the incidence of the condition in calves from our cross bred and pure bred cows, the latter being, on average, lower yielding. Calves which tend to suffer worse from white scour are the smaller ones at birth. It would appear that a better knowledge of the nutrition of the in-calf and lactating cow could be of considerable value so that control of white scour may then be more readily obtained by husbandry measures.

Calf growth

Over the period from birth to weaning, the single-suckled calf should gain in excess of 2 lb per day. Achievement of this level of performance depends upon genetic make-up and an adequate supply of food. During the early months of life, sufficient food means sufficient milk and the healthy beef x dairy breed dam should never be found lacking in this respect. Over the first weeks of lactation many cows will produce more than enough milk for their calf but we prefer not to hand-milk unless the udder becomes misshapen or the cow is in obvious discomfort.

Our records reveal a strong relationship between birth weight and subsequent liveweight gain. A 20 lb advantage in weight at birth increases to 56 lb by six months of age. Birth weight does not appear to be particularly sensitive to differences in nutrient intake by the in-calf cow and feeding 80 lb of medium-quality silage to our housed cross bred cows in late pregnancy produces calves of good weight and vigour at birth.

With cows and calves at grass, some form of grazing control is advisable if stocking rate for the season as a whole exceeds 0·5 cows per acre. Provided fields are not excessively large, subdivision by an electric fence can give satisfactory results. Calves pass under the fence and have the opportunity to exercise greater selection over their grazing, while the cows are forced to clean up the pasture rather better than they might otherwise do. Every opportunity should be taken to conserve the surplus grass, since the resultant aftermaths will aid in maintaining good liveweight gains in the calves. At higher stocking rates, calves should be carefully observed for signs of husk and, in mid-season, a stomach worm drench, preferably before moving to an aftermath, will often prove beneficial.

Creep feeding of suckling calves at pasture has rarely been shown to produce sufficient liveweight gain to justify the cost. However, creep-fed calves tend to accept concentrates more readily after weaning. The decision on whether or not to creep feed must be taken in the light of the producer's plans for the calves after weaning. If creep feed is given, this should consist of rolled barley and/or oats but inclusion of a little flaked maize can be useful at the outset in order to encourage calves to eat. To ensure that the majority of calves are eating creep feed by weaning, continuous access to the supply is desirable but a careful watch must be kept for the animal tending to over-eat as this can have disastrous consequences.

Maintaining productive and healthy stock

There comes a time, and this is very variable, after which the cow ceases to rear calves well and this calls for a decision on whether or not to cull from the herd. If only in this respect the value of weight records cannot be over-emphasized. If the cow's first and second calves are reared well, later calves can be expected to be of above average weight at weaning. A case can thus be made for early culling but in a herd of cross bred cows there is no guarantee that the replacements will be superior to those removed. Apart from the need to dispose of obviously unsuitable cows, no hard and fast rules can be made on culling and the aim should be to achieve a balance between productivity and a lengthy herd life.

One of the greatest health hazards in suckler herds is that of hypomagnesaemia. Cows in early lactation are particularly vulnerable and if this coincides with the common danger periods of April/May and late autumn, then special care should be taken. Where concentrates are fed these can be supplemented with magnesium e.g., inclusion of 2 oz of calcined magnesite per head daily in rolled barley, and, in our experience, trouble will largely be avoided. Where concentrate feeding is considered uneconomic or impracticable, dosing of cattle with magnesium alloy bullets can be considered but, unfortunately, not all experiences have been favourable. 'Lick-type' materials, home-made or proprietary, can give good results but it must be appreciated that where voluntary intake is relied upon, some cows may be inadequately supplemented. In theory, prevention of hypomagnesaemia should be relatively straightforward but, in practice, this is certainly not the case.

In an article of this nature, there is a danger of over-simplification and over-generalization. The arts of good management are not easily acquired. Much must be learnt by hard experience. However, adequate identification of stock combined with suitable performance recording is an invaluable aid to management which could be profitably employed by many producers.

A story about

The Thrybergh Farming Company

D. I. Gillies

THE Thrybergh Farming Company is a fully integrated production group of three farmers, located near Rotherham in the southern part of the West Riding of Yorkshire.

The members of the group are: P. J. Morrell of Chestnut Farm, E. J. Sellars of Old Oak Farm, and S. M. Telling of Grange Farm.

Chestnut Farm consists of 84 acres arable (70 acres of which is restored opencast workings), 20 acres of rough grazing, and 40 acres of restored tipping land at the side of the river Don. The enterprises on this farm before integration consisted of fattening cattle, pigs and cereals.

Old Oak Farm totals 69 acres of arable overlying coal measure sandstone. The soil is a good working loam and the enterprises on this farm, both before and since forming the Company, consist of potatoes, cereals, pigs and poultry.

Grange Farm totals 65 acres of arable. During the 1950s it was run as a small dairy farm. In the early 1960s dairying was discontinued, being replaced by a specialist poultry unit with all the land being ploughed for cropping.

The story of the development of co-operation between these farmers is most interesting. They are pioneers in the development of inter-farm co-operation in this county and have not been motivated by the prospect of receiving grant aid for their ventures—indeed the foundations of their now fully integrated business were laid long before the present grant aid scheme came into being.

Messrs. Morrell, Sellars and Telling have been used to working together for a good many years. In the days of the bagger combines, both Chestnut and Old Oak Farms had a machine, and the cereal acreage at Grange was harvested on a contract basis. Old Oak and Grange also planted and lifted their respective potatoes and drilled corn on a neighbourly basis.

The beginning of co-operation

In the spring of 1962, a discussion arose concerning the future of grain handling on each farm. The individual farms employed no staff and each had problems with handling and storing corn in sacks, made more acute when it had to be dried. The problem of grain drying was fully considered.

Should each erect a small drier or should they put up a single plant on a syndicate basis? After investigating all the possibilities, and taking into account that, due to the split ownership of the land, there would be no help available under the Farm Improvement Scheme, they decided to build a centralized grain drying and storage plant. By harvest 1962 a plant consisting of four eleven-ton drying bins and six forty-ton storage bins had been erected at Old Oak Farm. Each partner had exclusive use of two storage and one drying bin, the fourth drying bin being used for the seed barley which was to be grown by each in turn for sale to the others. The capital cost was shared on an equal basis and running costs were to be allocated in proportion to the cereal acreage on each farm in any one year. In the first harvest year the two bagger combines were still individually owned, but worked together on the cereal acreage of all three farms to provide a continuity of the supply of grain going into the store. Combining charges between the individuals were settled on a contract basis.

In the autumn of 1962, a further stage in development was the hiring of a muck spreader and working together to spread the muck on all three farms. Each member paid for the hire of the machine and provided tractor fuel for the period it was used on his own farm, but labour was shared on a neighbourly basis.

In 1963, it was decided to carry out spring sowing on a mutual help basis and this led to a degree of labour specialization. Mr. Telling worked down the land on all three farms using his own disc harrows. Mr. Sellars drilled all the barley with his combine drill, and Mr. Morrell did the final harrowing and rolling. This led to more expeditious and timely sowing of the crop. Potato planting was also carried out on a neighbourly basis, and Mr. Morrell, who grew no potatoes, was recompensed by having his corn spraying done by the other two.

Teething problems

Following the first harvest the physical problems became more clear—two men on two combines with the third transporting grain to the drier left the straw at risk. It was decided to sell the individually owned combines and purchase a larger tanker model on a syndicate basis and this was done for the 1964 harvest. A further benefit obtained at this time was the pooling of fertilizer requirements and bulk buying for the 1964 season which resulted in a substantial cost saving compared with prices quoted on an individual basis.

Originally, the practice was to commence drilling on the lighter land at Old Oak, and finish on the heavier soil at Grange and Chestnut Farms. At harvest the sequence was similar, but this left the later sown crops at risk, and in 1965 wet weather left a laid crop on one farm with consequent loss to the individual. For 1966 as a means of spreading this risk, the drilling was planned in twenty-acre blocks on each farm in turn.

In the spring of 1966, a tractor, complete with front-end loader, was purchased jointly on a one-third share basis, for use by each individual as required. Running and repair costs were to be similarly shared, but fuel was to be the responsibility of the individual.

At the same time there was also a major step towards full integration. This was the return to Mr. Morrell by his landlord of some forty acres of restored tipping land adjoining the River Don, which he decided to share

equally with his partners. The land was ploughed, drilled and sown with barley as a mutual operation with each individual contributing one-third of the cost of seed, fertilizer and spray chemical etc., and looking forward to a similar share from the sale of the crop.

Formation of the Company

This additional cereal acreage accentuated the problem in the grain store. Due to the need to retain individual identity of the barley, some bins following harvest would be only partly filled, whilst others were over-filled resulting in grain being taken elsewhere for storage. The logical solution was to grow the total cereal acreage on a co-operative basis and it was to this end that the Thrybergh Farming Company was formed in October 1966, taking over the arable land on all three farms as it was ploughed that winter. This rationalization of cropping and grain storage brought a further benefit in that it enabled a return to wheat growing as the crop could now justify being stored separately.

In 1967, the whole of the cereal acreage, mostly barley but with some wheat, together with sixteen acres of potatoes, was grown on a partnership basis. The arable machinery was taken over by the Company and the surplus sold. The autumn of 1967 saw the purchase of a secondhand potato harvester by the Company to ease labour problems with that operation.

The poultry enterprise was integrated at the end of 1967 with the erection of a new laying unit at Old Oak Farm. Initially, it consisted of three 1,200 bird battery houses built around a central underground slurry tank, with broilers being reared in isolation at Grange Farm. The Company became fully integrated in the autumn of 1968 with the take-over of the pig and beef cattle enterprises. Since that date the pig enterprise has been expanded on similar lines to the poultry, with fattening being centralized on one farm and the breeding sows kept elsewhere.

In the spring of 1969, the group made their first application to the Central Council for Agricultural and Horticultural Co-operation. This was for the fourth poultry house to complete the laying unit, but included an item to provide for legal costs etc. for preparing a constitution to satisfy the Council's requirements in that respect. Until this time the agreement between the partners, whilst it had been much discussed and most of the contingencies covered, was based very largely on mutual trust.

Benefits of co-operation

The table on p. 236, using standard gross margin figures but taking account of actual performance, attempts to measure the 'before and after situation' and quantify the financial benefits of co-operation.

It is intended, in the near future, as soon as the necessary accommodation can be erected, to increase sow numbers to 60 head, with all progeny fattened. As yet the fattening cattle, apart from a reduction on forage acres, have not been improved upon—they are retained mainly to make use of some eighteen acres of rough grazing. Undoubtedly fixed costs have risen from 1966 to 1970, but no additional labour is employed and machinery costs, through co-operation, are being contained. Had there been no co-operation it is true to say that the individual businesses would have expanded over the period.

Thrybergh Farming Company—Cropping and Stocking

	1966 as individuals	*1970 as partners*	*Increased technical efficiency*	*Gross margin change* £
Wheat (acres)	—	30	—	+ 1,279
Barley (acres)	226	203	+ 2 cwt per acre	− 309
Potatoes (acres)	8	16	+ 10 cwt per acre	+ 758
Grassland (acres)	42	27	—	—
Cattle fattening	25	25	—	—
Breeding sows	16	40	+ 1 weaner reared per sow	+ 809
Pigs fattened	430	700	− 0·5 cwt meal per pig	+ 1,071
Laying poultry	3,200	5,500	—	+ 1,898
Broiler throughput	48,000	48,000	—	—
				+ 5,506

It is fair to claim, however, that co-operation does enable the partners to handle a bigger business than would be the combined total as individuals. Furthermore, co-operation provides the opportunity for a degree of specialization leading to increased technical efficiency, which must be responsible for at least part of the increased financial benefit.

From the outset it was decided that the partners would share the costs and returns of their joint operation on a third share basis. This decision was facilitated by the farms all being of a similar acreage, but it was also felt that any other more complicated system would be less likely to succeed. The capital required to finance the arable operations was subscribed on an equal basis and the first charge against it, before any division of profits, is a rental to the individuals for the use of the land.

The integration of the livestock enterprises has meant some variation in the capital subscribed by the partners. Initially, interest on capital over the base level will be paid to the individual, but it is intended to once more equalize the individual capital contributions in the near future. Much foresight has gone into planning the financial structure of the Company and as many contingencies as possible have been provided for. Major stumbling blocks could have arisen at all stages, however, were it not for the willingness of the partners to place mutual trust in each other.

The division of responsibility is that Mr. Telling is in charge of the poultry; Mr. Sellars looks after the breeding pigs; and Mr. Morrell is responsible for fattening pigs and cattle. All three take decisions relevant to the arable side of the business.

Possibly the benefit they value most from working together is the fact that they now have every third weekend free. In 1969, the first time for many years, each had a fortnight's holiday with their families, confident in the knowledge that the business was being looked after properly by their partners. By pooling their resources they command a business more than three times as large as their original individual ones. By sacrificing their

independence, it is very evident to the outsider that they have a new-found freedom and greater confidence in the future.

Asked if, were they to start at the beginning again, would the integration take place more quickly, the answer is 'No'. It is relatively easy to integrate on the arable side, but it is important to settle the more simple problems of integration with crops to learn how to negotiate the greater complexities involved in integrating lifestock enterprises. 'Integration', in the words of Mr. Sellars, 'is a little like marriage. To be successful you have to learn to live together, and it is important to learn how to walk before you start to run'.

This article has been contributed by **D. I. Gillies, B.Sc.(Agric), N.D.A., S.D.D.H., (Scot).**, who is a District Agricultural Adviser for the N.A.A.S. in the West Riding of Yorkshire.

The Ministry's Publications

Since the list published in the April, 1970, issue of *Agriculture* (p. 174) the following publications have been issued.

MAJOR PUBLICATIONS

OUT OF SERIES

Experimental Husbandry Farms and Experimental Horticulture Stations. Progress Report. 1969 (SBN 11 240961 X) 12*s.* 6*d.* (by post 13*s.* 2*d.*) (New)

Farm Incomes in England and Wales. Report 1968 (SBN 11 240968 7) 16*s.* 6*d.* (by post 17*s.* 6*d.*) (New)

The following publications are available only from the Ministry of Agriculture, Fisheries and Food (Publications), Tolcarne Drive, Pinner, Middlesex. HA5 2DT. (They are not for re-sale.)

Radiation Safety in Veterinary Practice. 3*s.* 6*d.* (by post 3*s.* 10*d.*) (New)

Agricultural Land Classification Maps of England and Wales (Base map—1 in. O.S. 7th Series)

Sheet No. 75. Dumfries and Gretna* 1st pub. 1969. 20*s.* 6*d.*
Sheet No. 147. Bedford and Luton* 1st pub. 1969. 20*s.* 6*d.*
*Postage and Packing an extra 3*s.* for each 1 to 3 maps.

FREE ISSUES

ADVISORY LEAFLETS

No. 66. Raspberry Moth (Revised)
No. 87. Celery Fly (Revised)
No. 504. Seed Potato Sprouting (Revised)
No. 569. Powdery Mildew and Black Spot of Roses (New)
No. 570. Freeze Branding (New)

SHORT TERM LEAFLETS

No. 29. Choosing Selective Weed-killers for Annual Weeds in Root Crops and Kale (Revised)
No. 99. Low Rate Aeration of Grain (New)
No. 100. Storage of High Moisture Grain using Preservative Acids (New)

Priced publications, except where otherwise stated, are obtainable from Government Bookshops (addresses on p. 248) or through any bookseller. Single copies of the free items are obtainable from the Ministry (Publications), Tolcarne Drive, Pinner, Middlesex. HA5 2DT.

34. Nottinghamshire

J. S. Hopkins

THE county of Nottinghamshire covers about half a million acres. The area of agricultural land, however, is just under 400,000 acres after the toll of the loss of land to industry, housing, schools, hospitals and other needs have been met.

The River Trent flows from the Long Eaton through the City of Nottingham following a winding course through Newark northwards to Gainsborough and along its length through the county, accommodates six power stations, all of which are dependent upon coal from the Derbyshire/Nottinghamshire coal-fields. Additional land along the Trent valley has been lost from agriculture to meet the needs of gravel extraction although some of these acres have been subsequently restored to farming after the pits have been filled with pulverized fuel ash.

Many of the wet pits are to be retained as 'lakes' and after landscaping will be used for recreationa purposes. Notably, on the site of the old gravel workings to the east of the City of Nottingham it is proposed to create a particularly extensive recreational area, of which a feature will be a rowing course of international standard.

The absence of elevated land and low rainfall conditions have undoubtedly had the effect of determining the main farming systems practised in the county. These systems tend to follow the pattern of farming in the arable eastern counties, rather than the dairying and livestock raising systems practised in the areas of the west. Pig and poultry products are a particularly important sector of the agricultural output and there are many units of production of broilers and laying batteries of the vast Eastwood enterprise scattered throughout the county.

Over two-thirds of the agricultural land in the county is under arable crops of which cereals account for some 195,000 acres. Barley is the most extensively grown cereal crop and in 1968 occupied some 127,000 acres. There are two sugar beet factories, one in Nottingham and the other at Newark. Sugar beet and potatoes represent useful break crops from cereals and together account for approximately 30,000 acres. Vegetable crops are grown on a traditional market garden scale on the fringe of the City of Nottingham and the same crops are grown increasingly on a farm scale in the north of the county. Notwithstanding the relatively small size of the county it should be noted that the acres of rose nurseries, in aggregate, are the second highest of all counties in the country. The type of crops grown is much influenced by soil and references to the geological map gives a fairly reliable guide to the farming systems adopted.

The extreme western part of the county adjoining Derbyshire forms part of the Derbyshire/Nottinghamshire coalfield. Here the farms tend to be

small in size and dairying is the main source of income. It is in this area that some 3,000 acres of farmland, earlier disturbed through opencast mining, have now been restored to agriculture. Adjacent to these coal measures soils is an area of magnesian limestone which forms some of the best arable land in the county. It is a matter of regret that so much of this land has been lost to industrial development.

The most distinctive feature of the county is the large area of bunter sandstone which extends from Nottingham to Doncaster comprising some 80,000 acres of agricultural land. This includes the old Sherwood Forest which still contains large tracts of woodland and a composite area known as the Dukeries. The Dukeries at one time contained the parks and mansions of the Dukes of Portland, Newcastle, Norfolk, Leeds and Kingston, but today only the Duke of Portland is resident in the area at Welbeck. The bunter sandstone forms light and often gravelly soils naturally deficient in lime and potash. The special problems of farming this type of land in a comparatively low rainfall area are a feature of the Ministry's Experimental Husbandry Farm at Gleadthorpe, situated between Mansfield and Worksop. Farms on the sand are comparatively large (250–300 acres) but crop yields are lower than those on the better textured soils. Irrigation is practised on a considerable number of sandland farms but is restricted by the need for water conservation.

To the east of the sandland belt and again running from north to south is an area of much more fertile farmland on the Keuper Marls. Farming on the marls and on the glacial drifts overlying the marls is more varied than on the bunter sands. Dairy farming is more common and a wider range of cash crops are grown. This area is more rural in character than the western part of the county. The village of Laxton where the ancient Open Fields system of farming still survives with little change since Saxon times, is located on the Keuper plateau. The village of Laxton was purchased in 1951 by the then Minister of Agriculture and today the present Minister of Agriculture is still the Lord of the Manor.

The villages are mainly unspoiled as is the countryside and the rolling landscape is well wooded through the length and breadth of this productive farming area. A visitor might well feel that the natural serenity has been disturbed somewhat by the many and rather ghostly unmanned oil pumps which can be seen on many farms in these parts. The number of these pumping sites has increased considerably over the years since oil was first pumped at Eakring in 1939.

In the south and south-east of the county the lias clay and heavy boulder clay soils occur and there is a much higher proportion of permanent pasture in these areas. Much of such grassland forms the northern extremity of the Vale of Belvoir; it is from milk produced off the farmlands of this part of Nottinghamshire, and from farms in North Leicestershire and South Derbyshire handled at cheese factories and dairies in these parts, that the only authentic Stilton cheeses are made.

In the alluvial plain of the River Trent there is some excellent agricultural land. The better fields of permanent grass are first-class feeding pastures. Some of the land is, however, gravelly and suffers from summer drought. It has been noted in recent years that there has been a greater tendency among farmers occupying land in this flood plain to plough grass and sow arable crops in the full knowledge of the inherent risk of possible crop losses through flood conditions.

Hardstanding for Sugar Beet

P. D. Chamberlain, *Agricultural Land Service, Bury St. Edmunds*

For the motorist autumn is the time of year to avoid the country lanes of East Anglia unless he is prepared to have a mud spattered car, because the period from September to December is the sugar beet harvesting season and that usually means dirty roads. But there are ways in which the dirt nuisance can be reduced and, to the farmer, ways to improve the handling of the crop. The provision of hardstandings where the sugar beet can be stacked, cleaned and loaded before transportation to the factory is a great help.

Siting the hardstanding needs careful consideration. Of first importance is access to the land growing the beet and to the public highway. Long hauls by tractor and trailer over public roads should be avoided if possible; on the other hand it is not wise to have lorries using farm roads when these have not been designed for heavy loads. This points to choosing a site adjoining the highway, yet well placed to serve the arable land on the holding, but in these cases it is advisable to consult the Highways Authority on the actual siting if it is to be adjacent to a public road and, therefore, likely to lead to increased traffic. It is also often convenient to have the hardstanding close to or forming part of the yards around the farm buildings where use can be made of it for different purposes at other times. If the sugar beet growing area lies away from the buildings it is frequently possible to find a piece of waste ground, or an odd corner to a field, on which to site the hardstanding which would not cause any obstacle to cultivations.

On a compact holding with a relatively small acreage of beet one hardstanding should be sufficient to take the whole crop, but where the land under the crop is spread out and upwards of twenty acres of sugar beet are grown it is advisable to think in terms of two or more hardstandings situated to serve distant blocks of land. On a large holding it may well be prudent to provide a number of hardstandings although each is used only one year in three or four according to the rotation adopted.

No hard and fast rules are given for the size of a hardstanding, but a few notes may be helpful. It is usual to allow for storage of up to one-third of the crop though this proportion may have to be increased on the heavy lands where, to be on the safe side, the beet should be lifted by the beginning of December. The tonnage for which to cater also depends, of course, on the permits issued for receipt of the beet at the factory. The beet should be handled in sequence so the first beet stacked should be the first to be transported. Thus the method of stacking must be arranged to allow access in rotation to all parts of the stack. Using a fore-end loader, the stack can be heaped to an average height of about 8 ft which would contain just over one

ton per sq. yd, but greater heights can be obtained with the aid of an elevator. Apart from the stack itself, sufficient space must be allowed for machinery and for manoeuvring; it is surprising the amount of space sugar beet lorries need in which to turn round.

The concrete slab is usually between 4 and 6 in. thick depending on the soil type. Usually 6 in. is to be preferred. On stable soils (sands and gravels) a hardcore foundation for the concrete slab can be omitted, but on other soils a layer of compacted hardcore 3–6 in. thick will be required depending on the type of soil. On peat, silt or similar soil, metal reinforcement laid about 2 in. from the top surface of the concrete should be incorporated.

The return from capital spent on this type of work cannot readily be calculated, but the real return is the ability to load beet both quickly and cleanly perhaps during bad weather and on otherwise poor ground conditions. A hardstanding will also enable a cleaner sample of beet to be presented at the factory and, as there is no payment for the soil attached to it, there is little point in carting soil, or for that matter spreading it on the roads.

Now is the time to plan and put construction work in hand so that the hardstanding may be ready in good time for this year's harvest.

Publications on Fixed Equipment and Estate Work

The following Ministry publications are available from H.M.S.O. (*addresses on p. 248*) or through any bookseller.

Fixed Equipment of the Farm Leaflet No. 33. Concrete Road price 1*s.* 9*d.* (by post 2*s.* 1*d.*).

Fixed Equipment of the Farm Leaflet No. 43. Use of Concrete on Farm and Estate (SBN 11 240583 5) price 2*s.* 6*d.* (by post 2*s.* 10*d.*).

Bulletin 145 Farm Roads. 1st edition, 1957. Reprinted 1966 8*s.* (by post 8*s.* 8*d.*). Discusses types of roads and gives valuable information on standards and methods of construction. Illustrations and tables. (70 pp).

Free Publications—Short Term Leaflets

Buildings for the Single Suckled Herd S.T.L. 57

Farm Waste Disposal S.T.L. 67

Inwintering the Lowland Flock S.T.L. 63

Preservation of Grain Quality During Drying and Storage S.T.L. 24

(*Available from the Ministry* (*Publications*), *Tolcarne Drive, Pinner, Middlesex*).

in brief

- **Genetics in the bank**
- **Beef in boxes**
- **Urea for fattening lambs**

Genetics in the bank

ARE we in danger of losing valuable genetic material that may reside in unimproved breeds of livestock? Dr. M. L. Ryder, writing in the current Report of the Animal Breeding Research Organisation*, believes we are. Ever since the 18th century improvers opened up the road to selection for specific characters, domestic livestock of all kinds has moved through phase after phase to provide end products in line with contemporary thinking and demand. Inevitably, breeds have become more uniform as the selected genetic factors have been set increasingly firmly by successive generations. Selection for one set of characters incurs the loss of others. In modern circumstances, therefore, we may have to be looking around for the kind of genetic material that remains now only in unimproved animals; and it is the purpose of Dr. Ryder's article to enter a special plea for the setting up of a responsible body whose function it would be to study and preserve declining breeds—a form of genetic 'bank' in which a reserve fund could be drawn upon as and when needed.

Dr. Ryder cites the practice of choosing early-maturing fat lambs (mostly singles) as breeding replacements which may at times have led to an unconscious selection away from twins. Twentieth century economic pressures have, however, imposed the urgent need for increased fertility; hence recourse to the Finnish Landrace whose numbers before its fecundity had become at all widely known had decreased from one million in 1950 to a mere 170,000 in 1967. He points also to the potentially high lambing percentage of the related Orkney sheep which now remain only on the shores of the island of North Ronaldsay and feed exclusively on seaweed. The Soay ewes of St. Kilda, which are ready to take the ram in their first year and have a long breeding season and a high twinning potential, are another example of genetic reserve that we might be glad to draw upon. 'To those who maintain that certain breeds or characters are unlikely to be of any further value, the answer', says Dr. Ryder, 'is that one simply does not know. It may be better to preserve a breed with exceptional genes, rather than one having an exceptional frequency of the genes occurring in the remaining breeds.'

Although the emphasis in Dr. Ryder's article falls particularly on sheep, he refers also to the possibilities that exist among the once domestic but now feral goats in Scotland and to unimproved breeds of pigs, poultry and horses, all of which are worthy of preservation.

The close co-ordination and continuity that would be indispensable to a scheme of livestock preservation might, Dr. Ryder believes, be best provided by the formation of a scientific society, and the group of people who organized the Gene Bank first at Whipsnade and now at Stoneleigh could form the nucleus of it. Present wisdom seldom equates with future needs. If old breeds had not been allowed to die out a couple of centuries or so ago, we should have had some remarkably useful material today for genetical study and perhaps of not inconsiderable practical value.

*Obtainable from the Animal Breeding Research Organisation, West Mains Road, Edinburgh 7s 6d.

Beef in boxes

OUR wholesale meat markets could be taking on a new look in the next year or so if, as seems likely, the idea and practice of vacuum sealing beef cuts gains ground. In place of the serried ranks of carcases, shall we see just a multitude of characterless cardboard boxes uniformly stacked in the bays awaiting the attention of a forklift?

Inside new packing plants fat and bone are being removed from selected cuts of up to 50-60 lb, which are then put into laminated polythene bags. Each bag is then transferred to a machine which, within a few seconds, expels all the air and seals it hermetically. In this form the meat should, it is claimed, remain virtually fresh without refrigeration for up to a fortnight.

Already this new-fashioned marketing of beef is seen to be welcomed. The shortage of men skilled in the art of carcase dissection has for some time been worrying retail butchers. Add to this the special needs of supermarkets and self-service stores and it is plain that meat marketing in the High Street tradition is not going to be what it was. At the same time transport, by contrast to the manhandling of massive and awkwardly shaped sides of beef, is made a great deal easier.

But perhaps the strongest influence of all has come from the younger housewife, who has consistently made it clear that she wants her meat lean and without waste in the form of bone and fat. These vacuum-packed prime cuts should please her, notwithstanding that in all fairness she will be expected to pay a compensating increase in the price per pound.

Urea for fattening lambs

EXPERIMENTS over three years at Great House E.H.F. have added to our knowledge of the value of urea as a source of protein in the fattening of housed lambs. They are described by Mr. W. A. Kneale in the Farm's current Review. To a ration of 18¼ cwt rolled barley, 1¼ cwt dried beet pulp and ½ cwt minerals/vitamins which was fed to a control group, 33 lb urea was well mixed for feeding to the lambs under test. The crude protein content of the control ration was 9 per cent and that of the urea ration 13½ per cent. Over two separate yearly experiments daily liveweight gain, carcase weight and killing-out percentage were all higher for the urea-fed group, and food conversion was shown to be more efficient.

A third experiment sought to compare two natural sources of protein, soya bean and white fish meal, with urea, all with 13½ per cent crude protein in the mix. Lambs on the soya feed gave the best performance in all respects, and the highest margin over costs. Those on the fish meal and urea mixes tended to feed selectively, and a proportion of the protein supplement was refused. Using pelleted rations, the urea mix gave very similar liveweight gains and food conversion, and worked out at £5 per ton cheaper than the other rations used. Another point of interest is that when lambs of 70 lb liveweight were started on the experiment, they did better than an earlier group of 40 lb liveweight, which suggests the possibility that the more mature lambs are capable of utilizing the urea better. Bedding the lambs on straw and so giving them access to roughage, helped to prevent scours, which sometimes occurs as a consequence of a sole concentrate feed.

AGRIC

Books

Viruses, Vectors and Vegetation. Edited by KARL MARAMOROSCH. John Wiley and Sons, 1969. £14 1*s*. [£14·05].

In 1965 a conference on interactions between arthropods and plant-pathogenic viruses was held in Japan under the sponsorship of the United States—Japan Co-operative Science Programme. The Tokyo conference was limited by the specialist interests of the nineteen participants, and recognition of this fact has led to the preparation of the present volume by thirty-three authors who, between them, review a substantial part of what Walter Carter once called 'the ecological trinity' (the vector, the virus, and the host plant).

The contents range from methods to field practice; electron microscopy is dealt with in three chapters by Maramorosch, Shikata, Granados and Nasu; isolation and purification, hemagglutination, and tissue culture and bioassy problems are covered in five chapters by Brakke, Suzuki, Mitsuhashi, Saito, and Whitcomb, with Sinha contributing a very interesting article on serological and infectivity tests which aim to identify virus particles within specific internal organs of the vectors.

From a practical point of view little can be done to control the spread of plant virus diseases until the means of transmission is known, and two chapters are devoted to vectors which have attracted attention in the last decade: Teakle deals with fungi as vectors and hosts of viruses; Taylor and Cadman discuss nematode vectors. Although white flies and mites have been suspected as vectors for thirty years or more, intensive work on these groups has been done over the past ten to fifteen years, and it is summarized by Costa and Slykhuis respectively. Slykhuis raises a point which is certainly relevant to other groups of vectors: many of the plant-infesting mites cause toxic feeding symptoms that may be confused with virus diseases, and one is reminded of Teakle's point that some viruses which are apparently only transmissable by mechanical means may in fact be transmitted by fungi. There is clearly much scope for further work on new and unusual vectors, and on the interactions of plant viruses and virus strains within vectors, a topic discussed by Freitag in the light of evidence that a few viruses are dependent on the presence of a second virus within the vector before transmission, and there are also cases where the presence of one virus strain within a vector renders the vector incapable of acquiring and transmitting a second, related, strain.

The better-known homopterous vectors are discussed by Forbes and MacCarthy (morphology), Sylvester and Rochow (aphids), and Ishihara and Ling (leafhoppers), and there are reviews of host plant susceptibility (Swenson), transmission mechanisms of stylet-borne viruses (Pirone), virus inhibition by vector saliva (Nishi), and criteria of specificity in virus-vector relationships (Oman). There are useful chapters on rice viruses (Fukushi, Everett and Lamey), and one reviewing maize viruses and their vectors (Granados).

The book concludes with two chapters reviewing the possibility of disease control through vector control (Broadbent), and a new approach to vector control through the use of aphid-repellent reflective surfaces (Smith and Webb). These chapters indicate the increasing complexity of control techniques, and Broadbent emphasizes the need to educate more growers in the measures already worked out by the scientists. With Smith and Webb's call for increased efficiency, precision and specificity in vector control methods, the time may not be far off when specialist growers will need a degree in crop protection, with periodic refresher courses, if they are really to profit from the latest research.

A.H.S.

Worm in the Wheat. MARY FRENCH. John Baker, 1969. 30*s*. (£1·50).

From her home in Cornwall Mary French has written a stimulating, controversial book which will be praised or pilloried according to readers' own views; in that sense it may do no more than preach to the converted. In her own words, the object has been to put a 'case for justice for the primary producer, based on a regard for man as a unique individual, with an immutable claim to personal consideration and justice'. No one will dissent from the fundamental importance of that.

Her criticism of official agricultural policy in the second half of the twentieth

century, of the 'men in power' and of the runaway growth of urban population within a highly industrialized society 'demanding ever-cheaper food' and imposing a 'grave imbalance between town and country interests' are trenchant, and her prediction of the inevitable deterioration of man's estate patently springs from sincerely and spiritually held beliefs. She inveighs against an economic system that allegedly exploits farmers and farm workers, enters special pleading for the place of small farms as an integral part of the economy and draws upon the agronomics of other European countries and North America to elaborate and support her arguments.

Much of what the author says at a philosophical level will be widely endorsed; society always stands in need of such people as Mary French to hold up a mirror to contemporary life. But equally, there may well be a feeling among readers that on the economics side some of her argument is less cogent by reason of its subjectiveness—rather like looking through a telescope, which magnifies the detail at the expense of the landscape as a whole.

S.R.O'H.

Energy Metabolism of Farm Animals. Edited by K. L. BLAXTER, J. KIELANOWSKI and GRETA THORBEK. Oriel Press, 1969. Five guineas.

This is a record of the proceedings of a conference held in Poland in 1967, when about one hundred animal nutritionists from all parts of the world gathered to discuss papers on the energy requirements of cattle, sheep, pigs and poultry—and even rats and shrews! The conference was also the occasion of a successful rapprochement of West and East. Dr. Blaxter of the Rowett Institute was at pains to point out that there was agreement between Professor Nehring of East Germany and himself in respect of the logical framework of the net energy system, and that they differed only in their views about the best way to apply the system in practice.

The book begins with invited lectures from each of these workers and ends with another from Professor Kleiber of California. In between, the papers are grouped under the following main headings, the number in brackets indicating the number of contributions under each head: 'Estimation and Prediction of Energy Value of Feeds' (5); 'Physiological and Biochemical Aspects of Energy Metabolism' (8); 'Energy Metabolism and Food Utilization by Sheep and Cattle' (12), 'Pigs' (7), 'Rats and Poultry' (10); 'Calorimetric Methods and Techniques' (9) and 'Data Processing Techniques' (5). Almost all the authoritative schools are represented in the papers and discussions following; the book is indispensable for serious workers in modern nutrition.

It is not easy reading, although rewarding, for the very nature of the subject matter demands treatment by mathematical formulae, graphs and tables. As a result, a casual dipping into the book may produce an impression of something formidable and forbidding. Each communication, however, is admirably clear in its presentation, although contained in a small space, and expansion is allowed for by the excellent lists of references following most papers which direct the reader to related published work.

The book, which is entirely in English, is well produced and only a few minor misprints have been noticed.

S.M.B.

Abstract Bibliography of Fruit Breeding and Genetics to 1965. Prunus. R. L. KNIGHT. Commonwealth Agricultural Bureaux, 1969. £6.

Both cherry and plum growers in this country are now facing considerable problems. The chief hope for this section of our fruit growing industry to remain economically viable lies in the breeding of cultivars which are adapted to modern needs. If the scientist can first assemble all the available basic information much valuable time can be saved at the start of any new breeding programme.

This compilation of published information on Prunus has been ably done by Dr. Knight who is himself already well known as a plant breeder. His work will prove invaluable not only to breeders but to all who undertake any serious study of the fruit bearing cultivars of this genus.

In this book he has 2,921 abstracts from world literature covering, not only the breeding of apricots, cherries, peaches, plums, including damsons but also allied factors such as pest and disease resistance and practical information on pollination, flowering periods etc. To prepare this bibliography must have required the careful scrutiny of a large volume of literature which must have been time consuming. However, the time spent by Dr. Knight and his staff will save time for the readers of

this book by having all the information on *Prunus* condensed into 649 pages. One hundred-and-ten of those pages consist of the index which is as valuable, or even more valuable, than the abstracts themselves, as it provides a very quick reference to any particular subject including cultivars. The index is separated into almond, apricot, cherry, peach and nectarine; plum, damson, myrobalan and prune varieties followed by a general index. For example, if information was required on Van cherry, reference is made to its ascorbic acid, breeding behaviour, cracking, derivatives, origin, pollination and pollen, self-fertility and virus, making a very rapid assessment possible.

As one who has had to make reference to pomologies and scientific literature all his life, it is impossible to state the value of this bibliography which has been very carefully prepared and edited, other than to say that it will become a reference work for all fruit breeders, students of fruit and anyone interested in the genus Prunus.

J.M.S.P.

Soils of the Saffron Walden District. (Memoirs of the Soil Survey of Great Britain). 1969. A. J. THOMASSON.

This is the second in a new series of special surveys published by the Soil Survey of England and Wales. It covers 700 square miles of a highly productive, mainly arable farming area around Saffron Walden extending nearly to Cambridge in the north and approaching Chelmsford to the south. The area surveyed includes parts of Essex, Hertfordshire, Cambridge and Suffolk and adjoins that of the *Soils of the Luton and Bedford District* immediately to the west.

The area mapped is complex and includes soils developed on such geological formations as The Chalk and London Clay as well as various types of glacial deposit and alluvium. Like the report on the soils of the Luton and Bedford District it is a reconnaissance survey at 1 in. to the mile.

This report contains a short chapter on soil parent material and classification, followed by the main chapter on the soils mapped and their agricultural properties. The appendix includes detailed descriptions of important soil series and analytical data.

Being a reconnaissance map the mapping units are soil associations, rather than individual soil series. Each soil association contains usually one but occasionally two or three major series occupying most of the area, with small proportions of up to four minor soil series occurring in a pattern related to land form. Although less easy to interpret than more detailed surveys mapping individual soil series it is, nevertheless, a valuable addition to our knowledge of the soils of East Anglia.

Copies may be obtained from the Librarian, Rothamsted Experimental Station, Harpenden, Herts. Price 11*s.* [55p] with map, (5*s.* [25p] without map).

D.J.E.

World Crop Protection. Volume 2, Pesticides. K. A. HASSALL. Iliffe, 1969. 85*s.* [£4·25].

The advent of yet another book on pesticides may seem unnecessary considering the number of standard works already available. It is, perhaps, also unfortunate that the title is so inappropriate to the actual content as this is not a catalogue of pesticides and their uses throughout the world. As the author points out in his preface, the greater part of this work is concerned with the 'scientific principles which relate to the formulation, persistence, degradation, synergism, toxicology and side affects of pesticides'. The term pesticide in this context, albeit for the want of a better word, refers to insecticides, acaricides, nematicides, fungicides and herbicides.

The scene is set by an altogether too brief introductory chapter on the historical background and development of pesticides, their production and usage, the economics of pest control and general considerations of toxicity and safety measures. It is not surprising to find that of the compounds used to illustrate the various topics, insecticides occupy about half the space allotted for this purpose, one-third of which is inevitably devoted to the organochlorines. Contrary to expectations, in view of the scale of their development and use, herbicides receive rather meagre treatment and occupy only about half as much space as is given to fungicides. Reference to several recent comprehensive works on herbicides perhaps explains this imbalance.

With these limitations there is much to commend in this book. The factual material is complete, up to date and well supported by extensive literature references; the author's style is direct and the illustrations and general reproduction clear and concise. A minor criticism is the occasional unnecessary use of proprietary names where common chemical names already exist and actually appear in the text. Agricultural students and technical advisers should find this book invaluable as a comprehensive review of the principles of crop protection.

G.S.

Agricultural Chemicals Approval Scheme

Third List of Additions and Amendments to the 1970 List of Approved Products for Farmers and Growers.

NEW CHEMICALS

CHLOROPICRIN with D-D and METHYLISOTHIOCYANATE

A glasshouse soil sterilant for control of certain soil fungi, eelworms and weeds before planting carnations, lettuce or tomatoes.

Liquid Formulations

Di-Trapex CP—Huberts

DICHLOROPROPENE

An organochlorine nematicide previously only available in the mixture D-D. For control of potato cyst eelworm pre-planting of early potatoes and tomatoes, root-knot eelworm under glass; stem eelworm in strawberries after the plants are removed; Docking disorder in sugar beet by pre-sowing application.

Liquid Formulations

Telone—Dow Chemical

PROPOXUR

A carbamate insecticide for the control of aphids on hops.

Wettable Powders

Undene (Bayer 5006)—Baywood

THIOMETON

A systemic organophosphorus insecticide for the control of aphids on the following crops:

Dusts—potatoes, fodder beet, sugar beet, mangolds.

Liquid Formulations—As for dusts and in addition on carrots, parsnips, red beet, peas and beans.

Dusts

'Dry Spray' Ekatin—Chafer

Liquid Formulations

Ekatin—Farm Protection
Ekatin—Sandoz

Note This announcement supersedes that made in the First List of Additions to the 1970 List.

NEW APPROVED USES OF APPROVED CHEMICALS

DICHLOBENIL

Approved for control of annual and perennial weeds in raspberries, roses and certain ornamental trees and shrubs.

NEW PRODUCTS CONTAINING APPROVED CHEMICALS

DICHLORPROP with 2, 4-D

Amine Salt Formations

S.A.S. 2,4-D.P. + 2,4-D—Sands Agricultural Services

DICHLORPROP with MCPA

Ester Formulations

M.A.C. 2,4-D. P. + M.C.P.A. Ester—Mirfield

Potassium and Sodium Salt Formulations

Cleanacres 2,4-D. P. Plus—Cleanacres
S.F.C. 2,4-D. P./M.C.P.A.—Stewartry Farm Chemicals

DINOSEB

Amine Salt Formulations

S.A.S. DNBP (Amine)—Sands Agricultural Services

Formulations in Oil

S.A.S. DNBP (in Oil)—Sands Agricultural Services

FENTIN ACETATE with MANEB

Wettable Powders

Maneb-Brestan—Hoechst

MANEB with ZINC OXIDE

Dithiocarbamate mixture for control of potato blight.

Wettable Powders

MZ-4—Universal Crop Protection

MCPA

Potassium and Sodium Salt Formulations

S.F.C. M.C.P.A.—Stewartry Farm Chemicals

MECOPROP alone

Potassium and Sodium Salt Formulations

S.A.S. C.M.P.P. 48—Sands Agricultural Services

METIRAM

Wettable Powders

Polyram Fungicide—BASF

Company Information

The following firms have recently joined the Agricultural Chemicals Approved Scheme:

Sands Agricultural Services (Norfolk) Ltd.,
The Garage, Ingham, Norwich,
Norwich NOR 337,
Tel: Stalham 781/2

Stewartry Farm Chemicals Ltd.,
63 Queen Street.
Castle Douglas,
Kirkcudbrightshire.
Tel: Castle Douglas 2011

Change of Address:

Ciba Agrochemicals Ltd.,
Whittlesford.
Cambridge CB2 4QT.
Tel: Sawston 3621-7

Trace Mineral Studies with Isotopes in Domestic Animals. INTERNATIONAL ATOMIC ENERGY AGENCY. H.M.S.O., 1969. 33*s*. 4*d*. [£1·66½].

This book records the proceedings of a panel organized by the Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture, held in Vienna in October, 1968.

It is well known that mineral deficiencies and excesses can prevent animals from reaching their maximum production and one useful way of studying mineral metabolism is by using radioactive or stable isotopes. The meeting was attended by experts from ten countries and two international organizations. Eight papers were presented evaluating the present status of trace mineral research and its relation to animal protein production in developing countries and recommendations were made, outlining future research work considered most likely to produce beneficial results.

Most of the papers are too specialized to be of practical value to the farmer or agricultural adviser, but the article by Dr. J. Payne of the Agricultural Research Council Institute for Research on Animal Diseases, on 'Production Disease—A New Concept of Man-made Diseases associated with developing Agricultural Systems', and a review of the current knowledge on magnesium metabolism in ruminants, are of general interest.

Other papers describe the use of isotopes in studies of the transfer of iron from mother to foetus, and of uptake of radioactive copper by the liver of cows under various conditions of diet and management.

Although it is well known that manganese is an essential element and that its deficiency results in severe leg deformities in young chicks, until recently little was known about the biochemical functions of manganese. Papers from Yugoslavia and Germany describe work with radioactive isotopes of manganese in studying absorption and utilization of manganese and its relation with other trace elements. A sensitive method for determining trace amounts of selenium by neutron activation analysis is described.

The panel's recommendations emphasized the need for co-operation between soil, plant and animal experts to anticipate problems which may emerge as the result of changes in agricultural practices.

G.L.

Index of Agricultural Research 1969. AGRICULTURAL RESEARCH COUNCIL. H.M.S.O. 1970. 12*s*. 6*d*. [62½p].

The index provides details of the research in progress in the Agricultural Research Council's institutes and in the institutes grant aided by the Council or by the Department of Agriculture and Fisheries for Scotland.

Brief details are given on the research and experimental establishments maintained by the Ministry of Agriculture, Fisheries and Food, the Department of Agriculture for Scotland and The Ministry of Agriculture, Northern Ireland. It also mentions the work supported by research grants and universities and other bodies.

The index is arranged in alphabetical order of institute and unit, as are their component divisions, departments or sections. It is good value at 12*s*. 6*d*.

ACKNOWLEDGMENT OF PHOTOGRAPHS

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MINISTRY OF AGRICULTURE FISHERIES AND FOOD

Nitrogen and Soil Organic Matter

This bulletin is a record of the papers presented and of the discussion which followed at a conference organized by the Soil Scientists of the National Agricultural Advisory Service. It contains much information which will be of great value to research workers and advisers throughout the world who are concerned with nitrogen in the soil and for plant growth. (Technical Bulletin 15). (SBN 11 2409156)

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